DOCUMENT RESUME

ED 032 736 EF 003 562

By-Zelip, Frank F.

Guidelines for School Planning and Construction. A Handbook for School Business Officials.

Association of School Business Officials, Chicago, Ill. Research Corp.

Report No-RB-8

Pub Date 68

Note-92p.; A special report prepared by the ASBO Research Committee in Schoolhouse Planning and Construction

Available from-Office of the Director of Research, Research Corporation of the ASBO, 2424 W. Lawrence Ave., Chicago, Illinois 60625 ($1.00)

EDRS Price MF-$0.50 HC-$4.70

Descriptors-*Critical Path Method, *Educational Finance, Environmental Influences, Guidelines, Purchasing, *School Construction, School Maintenance, *School Planning, Site Development, *Site Selection

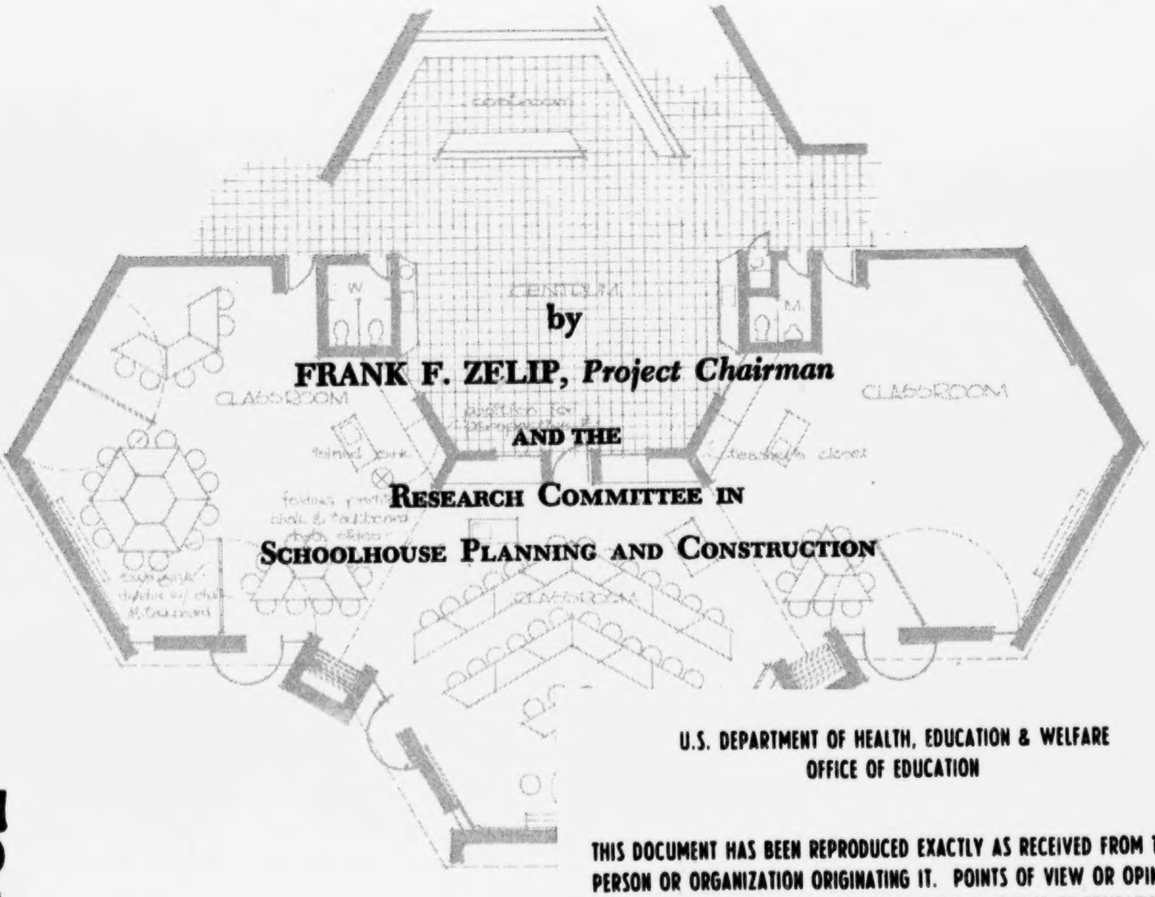
A handbook of guidelines is presented for school business officials who are concerned with schoolhouse planning and construction. In this research handbook, several contributing authors present analyses and guidance with regard to: (1) the need for careful study in selecting, acquiring, developing, and utilizing school sites, (2) selection of, and work with, architects, (3) considerations of the total school environment, (4) analysis of guarantees, warranties, and construction bonds, (5) consideration of the critical path method, (6) selection and purchase of equipment, (7) supervision and inspection of building construction, and (8) management of school plant maintenance. (FS)

ED0 32736

RESEARCH BULLETIN NO. 8

Guidelines for School Planning and Construction

A Handbook for School Business Officials



by

FRANK F. ZELIP, *Project Chairman*

AND THE

RESEARCH COMMITTEE IN
SCHOOLHOUSE PLANNING AND CONSTRUCTION

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

published by the

RESEARCH CORPORATION
OF THE
ASSOCIATION OF SCHOOL BUSINESS OFFICIALS

EF 003 562

This publication is one of a series of Research Bulletins brought to you as a service by ASBO, and its subsidiary, the Research Corporation of the Association of School Business Officials.

This publication has been approved by both Boards of Directors.

1968 Board of Directors

President
THOMAS A. LINTON, R.S.B.A.
Milwaukee, Wisconsin

President Elect
ERNEST C. GRAYSON, R.S.B.O.
Louisville, Kentucky

Vice President
RIDGLEY M. BOGG, Ed.D.
Great Neck, New York

Executive Committeeman
and Parliamentarian
ROBERT D. SCHOALES, M.R.A.I.C., R.S.B.A.
London, Ontario

Executive Secretary, Editor
and Director of Research
CHARLES W. FOSTER, Ed.D., R.S.B.A
Chicago, Illinois

Directors
DALE DOUGLAS, R.S.B.A.
Houston, Texas

DAVID H. RHONE, R.S.B.A.
Fallsington, Pennsylvania

ERNEST W. RICHARDS, JR., R.S.B.A.
Phoenix, Arizona

HENRY J. BENNINGEN, C.P.A.
Winnipeg, Manitoba

DONALD I. PRYOR, R.S.B.A.
Edina, Minnesota

ROBERT W. WALKER, R.S.B.A.
Lansing, Michigan

THE RESEARCH CORPORATION of the Association of School Business Officials is an educational research organization, devoted to the development and improvement of selected areas of school business management and publishing information and research about them. Additional information is available from:

Dr. Charles W. Foster, R.S.B.A., Director of Research
Research Corporation of ASBO
2424 West Lawrence Avenue
Chicago, Illinois 60625
U.S.A.
Telephone: Area Code 312; 728-3204

Guidelines for School Planning and Construction

A Handbook for School Business Officials

Directed by
Frank F. Zelip,
Project Chairman and Principal Author
published by the

RESEARCH
CORPORATION
Founded 1963

A Special Report

Prepared by the ASBO Research Committee in
Schoolhouse Planning and Construction

RESEARCH BULLETIN NO. 8

"PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL HAS BEEN GRANTED BY the Association of School Business Officials TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE U.S. OFFICE OF EDUCATION. FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER."

COPYRIGHT 1968 BY THE
RESEARCH CORPORATION
OF THE
ASSOCIATION OF SCHOOL BUSINESS OFFICIALS

An Educational Research Organization
Incorporated Not For Profit

All Rights Reserved Under International

Library of Congress Catalog Card Number: 68-8087

PUBLISHED BY THE
RESEARCH CORPORATION
OF THE
ASSOCIATION OF SCHOOL BUSINESS OFFICIALS

and Pan-American Copyright Conventions

OFFICE OF THE DIRECTOR OF RESEARCH
2424 WEST LAWRENCE AVENUE
CHICAGO, ILLINOIS 60625
Printed in U. S. A.

All members of ASBO receive a copy of this *Research Bulletin* as part of their 1968 membership or subscription. The interested general public may obtain copies at cost from the Director of Research at the address above.

Price: $1.00 per copy

Please make checks payable to:

ASSOCIATION OF SCHOOL BUSINESS OFFICIALS

EDITED BY
CHARLES W. FOSTER, ED.D., R.S.B.A.
DIRECTOR OF RESEARCH AND EDITOR

Table of Contents

ACKNOWLEDGMENT 5

FOREWORD 6

CHAPTER

I. FISCAL PLANNING 7
   Clyde Bunnell, Fort Worth, Texas
   Planning the Bond Issue
   The Bid
   Other Methods of Financing
   Summary

II. SITE 14
   Lester E. Andrews, Council Bluffs, Iowa
   Selection
   Environment
   Zoning
   Acquisition
   Development

III. RELATIONS WITH ARCHITECTS 20
   Lloyd V. Long, Winnetka, Illinois
   Selecting an Architect
   Educational Specifications
   Standardization
   Bidding Laws
   Alterations

IV. GUARANTEES 24
   Frank F. Zelip, Cicero, Illinois
   Surety Bonds — Contractors' Bonds
   Definitions — Warranty and Guaranty
   Analysis of Contract Documents
   "As Built" Plans

V. ENVIRONMENT 29
   Dr. N. L. George, Oklahoma City, Oklahoma
   Sonic
   Visual
   Thermal

VI. THE USE OF THE CRITICAL PATH METHOD IN SCHOOLHOUSE CONSTRUCTION 34
   Dr. Henry F. Daum, Abington, Pennsylvania
   What is the Critical Path Method?

The Working Tools of the Critical Path Method
How to Obtain Critical Path Method Service
What to Expect from the C.P.M. Consultant
What Should C.P.M. Cost?
The Usefulness of C.P.M.

VII. SUPERVISING AND/OR INSPECTING SCHOOLHOUSE CONSTRUCTION 42
Frank F. Zelip, Cicero, Illinois
Responsibilities of the Inspector

VIII. MOVABLE EQUIPMENT 44
Paul M. Goodfellow, Los Alamos, New Mexico
Economy Versus Quality
Standardization
Specifications
Delivery Schedules

IX. BUDGETING AND MARKETING OF SCHOOL MAINTENANCE 48
Burton Froberg, North Kingston, Rhode Island
Low Maintenance Cost Materials
Custodial Supervision and Operation
Contractors' and Manufacturers' Responsibilities for Instructing Personnel

APPENDIX A, EDUCATIONAL SPECIFICATIONS
EDSPECS – Foundation for Good Buildings 51
Dr. William O. Wilson and Louis E. Saavedra
Standardization of Educational Specifications 56
Dr. Walter L. Nelms
Taking the Mystery Out of Educational Specifications Writing 59
William Lyman

APPENDIX B, SCHOOL PLANT, CONSTRUCTION AND MAINTENANCE RECORDS MANUAL 64
Frank F. Zelip

APPENDIX C, SCSD – A SIGNIFICANT CONCEPT 72
School Planning Laboratory of Stanford University

APPENDIX D, HOW DO *YOU* PAY *YOUR* ATTORNEY FOR SERVICE RELATED TO BOND PROCEEDINGS? 76
Dr. Frederick J. Byrnes

BIBLIOGRAPHY 81

INDEX 83

ACKNOWLEDGMENT

FRANK F. ZELIP, Project Chairman

ASBO's grateful acknowledgment is made, and our appreciation expressed, to Frank F. Zelip who, in his capacity as Vice Chairman of our Research Committee in Schoolhouse Planning and Construction was chairman of this project, and principal author of this bulletin.

Acknowledgment is also made to Dr. Wallace H. Strevell, Chairman of this research committee, for his encouragement and inspiration; to each member of this committee who wrote a chapter in this publication, and to each person who contributed in any way to the success of this important research project.

Special acknowledgment is made to Robert J. Plomin, editorial assistant, for his many hours of work and effort assembling, checking, proofreading, and otherwise assisting with this project; and to Anne T. Zitkovich, M.A.L.S., Research Librarian, for her assistance with the bibliography.

This research bulletin has been approved by the Board of Directors. It is considered a good contribution to the literature in the school business field, within the profession of Education.

Each ASBO Research Committee has as its goal a research project which can ultimately result in a valid and reliable publication, known as a Research Bulletin. These bulletins are both a contribution to the literature in the field, and also help to relieve a burden from Government. If ASBO didn't produce these Research Bulletins, the interested general public would expect the Government to do so.

– Dr. Charles W. Foster, R.S.B.A.
Editor of Publications

Foreword

Providing a practical reference handbook of guidelines for school business officials who are concerned with schoolhouse planning and construction is the intention of the several authors' contributions to this initial portfolio. Admittedly, although much more literature could have been prepared, this beginning effort can be supplemented and/or revised periodically with suitable content material as needed.

Changes in school design, based upon the experiences of the past, school population growth, changing philosophies, and the like make it most desirable to prepare this type of flexible format. Incorporating new trends in teaching methods results in new requirements for the best design and use of space in the instructional program. Audio-visual aids, electronic information devices including TV, tape recorders and teaching machines, usage of libraries in connection with study carrels, all reflect new philosophies for school design and construction. Because school buildings of necessity are more or less permanent structures, planned and financed for long-term usage, it is most essential to ascertain what educational specifications and structural commitments can be accepted and how they can be implemented in schoolhouse construction.

Contributors to this research handbook attempted to present specific areas of consideration by school business officials in schoolhouse planning and construction. The need for careful study in selecting, acquiring, developing, and utilizing school sites, selection of and working with architects, considerations of the total school environment, analysis of guarantees, warranties and construction bonds, consideration of the critical path method, selection and purchase of equipment, supervision and inspection of building construction, and management of school plant maintenance are submitted for analysis and guidance.

Frank F. Zelip
Project Chairman

CHAPTER I

Fiscal Planning

by CLYDE BUNNELL
Assistant Business Manager
Fort Worth School District
Fort Worth, Texas

The role of the school business official is usually defined by the Superintendent and the Board of Education. This exact role will vary among districts, states, and provinces. However, in general, the school business official is directly or indirectly responsible for all the business functions of the district. His role is one of leadership in business management.

In schoolhouse planning and construction, the school business official plays an increasingly important role in school debt management and policies. Financing school construction requires that a comprehensive analysis be made of the financial condition of the district. This analysis includes the existing debt, debt limits, property valuation, tax levy, regulations, and laws governing debt.

Planning the Bond Issue

Methods of financing schoolhouse construction will vary among states and provinces. However, the most universal method is by the sale of bonds. Approximately two-thirds of all school construction is financed by the sale of bonds. The role of the school business official is obviously very important and exacting in the sale of bonds. Each step requires careful planning and procedure.

If a bond issue is anticipated, an important consideration is the financial rating or bond rating assigned by national rating agencies, such as Moody's Investment Service and Standard and Poor Corporation. The bond rating is very important because it is a factor in determining the interest cost and the marketability of the bonds.

Bond ratings are based upon a number of factors, namely: the economic conditions of the district (40%); debt-paying habits of the community (25%); financial factors, such as how much the district owes, how much it is likely to owe 10 years hence, how aggressively taxes are collected, and knowledge of the character and ability of management (25%); and, last but not least, marketability factors (10%).

Although the financial history and existing conditions of the district usually determine the bond rating, it is the responsibility of the school business official to explore this rating and recommend the possibility of improving it. This means furnishing financial records and all pertinent information to the rating agencies. Frequent conferences with personnel representing the rating agencies are advisable.

The first step in planning a building bond issue is to employ competent counsel. Some districts may have a competent person in the school business official who can act in the capacity of financial advisor. This is especially true when a district is fortunate to be associated with an outstanding financial banking institution. However, it is not always true that a district is able to use its regular legal counsel in handling a bond sale. The work of the bond attorney is highly specialized.[1]

The second step in planning a building bond issue is to determine the type of loan sought by the district, for example: Is it for a short term or a long term? Is it a special type, self-liquidating, or general obligation loan? Is it payable from unlimited or limited *ad valorem* taxes? This is an area where the advice of the financial consultant should be sought, since the financial advisor has knowledge of the type of loan or bond that is more attractive in the market place.

In general, borrowing for school construction is associated with the issuance of long term obligation bonds. However, full consideration should be given the short-term obligation because of lower interest costs. Many times it is advantageous for the district to combine short term notes and long term bonds. This procedure provides flexibility in timing the bond sale and in some cases may reduce the length of the bond issue.

School bonds are classified as: 1) serial bonds, 2) straight term bonds, 3) sinking fund type bonds, or 4) a combination of these plans.[2] School districts generally are required to issue serial bonds. These call for a repayment of part of the principal each year to reduce interest costs. The schedule of such payments, within limits, can be geared to the payment schedule of other outstanding indebtedness, to the tax-rate effects of annual debt service, and to future obligations likely to be incurred. These are matters to be carefully studied in fiscal planning.

---

[1] See Appendix D for a discussion of "How To Pay A School Bond Attorney."

[2] Wallace H. Strevell and Arrid J. Burke, *Administration of the School Building Program,* (New York: McGraw-Hill, Inc., 1959), p. 327.

The straight term bond provides that the entire principal shall be repaid at some future date. It involves the maximum interest cost and is most advantageous to the lender. Unless a sinking fund is created to accumulate the money, the straight-term bond can create extreme problems.

The sinking-fund type of bond, theoretically, has the same advantages as the serial bond with greater flexibility. However, the interest collected may be less than the interest paid, and so may be more expensive. The very flexibility which it provides may result in not having the money available to repay the loan when due. Often it requires a separately earmarked tax. The sinking fund itself demands much more management than does the serial bond. It is not authorized in many states and should be used where authorized with extreme prudence.

The *callable bond* ordinarily commands a higher rate of interest because it may be repaid at any time at the option of the borrower. It could have advantages under certain circumstances, such as anticipated increases in property valuations, expected increases in federal or state assistance, a major reduction in debt service to occur in the future, or other factors which could reduce costs or taxes or increase assets. The higher interest costs and penalties have to be weighed against the probable saving that could result from early payment.

However, once the type of bond is determined, the function of the bond attorney becomes much more essential because it is his responsibility to ascertain if the type selected can be legally issued. The district can issue negotiable bonds only to the extent and in the manner prescribed or permitted by the laws of the state in which the district is situated. Together, the school business official, the banker or financial consultant, and the bond attorney should be able to devise a type of bond issue which will be the most attractive possible under the circumstances peculiar to the economic condition of the district. An issue so devised would be more likely to receive favorable consideration by the bond rating agencies.

Preparation of the bond issue, which is very important, may be considered as the third step. Among items that need to be considered in the preparation of bonds for sale are the governing laws, payment records, future needs, resources, tax limitation, and existing debt payment schedule. The bond attorney is responsible for ascertaining, interpreting, and applying the laws of the state governing the issuance of bonds by a school district of the particular state. His duties, obligations, and responsibilities are to the ultimate owner of the bonds. The obligation as evidenced by the bonds must be valid and enforceable against the issuer, hence, the bond attorney is required to state unqualifiedly in writing that in his opinion all of the requirements of the law have been complied with and that the bonds are valid and enforceable obligations of the school district. It is to the best interest of the district that its proposed bonds be authorized strictly in accordance with the laws governing their issuance, thus assuring the legal soundness of the security, an ingredient vital to the successful marketing of the bonds.

Bond counsel has a vital place to fill in the proper preparation of bonds for market. A bond is a contract and the courts have held that every step taken in the authorization and sale of bonds constitutes a part of that contract. The election proceedings, notices of sale, bid forms, authorizing proceedings, and delivery all constitute a part of the bond contract and are essential to its validity. It is not necessary that each document be prepared by the bond attorney, but it is wise to refer all documents to him for review prior to their execution or publication.[3]

After careful preparation of the issue, the next step is the sale of the bonds. This is normally administered by the school business official. Competition in the bond market is keen. Approximately one-fourth of the Municipal Bonds sold are for school purposes. This points up the great amount of activity and competition in the bond market.

Interest cost is an important element in school construction when the construction is financed by borrowing. In order to effect as low an interest rate as possible, some important points are: notice of sale, date and day of week, hour, official awarding and delivery.

Notice of the proposed sale and approximate date of the offering should be given to prospective buyers as far in advance as possible. This permits formation of syndicates and provides channels through which information essential to a proper evaluation of the proposed bonds can be best disseminated. It will also assist in providing more flexibility, in underwriting of the issue, and in subsequent marketing. If sufficient notice of the delivery date of the issue and the approximate timing of the sale is given to potential investors, they can better plan their investment programs, thus assuring the district of the broadest possible investors' interest. Any change in timing or other plans should, of course, be communicated promptly to investment bankers.

The sale should be scheduled for a date on which there is not a large volume of other issues scheduled. This information can be obtained from the Daily Bond Buyer. Bond sales should be scheduled to avoid conflict with issues within the same tax-paying area. For example, a city, a county, or a school district in the same area should avoid offering their bonds within the same period of time. In the past, Tuesday has been considered the best day

[3] *Ibid.*

of the week on which to schedule a sale. There is now such a heavy concentration of offerings on Tuesday that either Wednesday or Thursday should be considered better target days for an offering. Mondays and Saturdays should be avoided, as well as the day before and the day after a holiday. If it is necessary for a district to come to the market frequently, adequate time should be allowed between issues to afford ample market protection. Selling a bond can be very difficult when the BLUE LIST, a trade publication showing current offerings of bonds, is full of the same names.

The Bid

The mathematical computations involved in computing a bid may take anywhere from fifteen minutes to several hours, depending upon the bidding conditions that are specified in the notice of sale. Potential buyers need to have a final price deadline prior to the time that these computations are started in order to set the bid. This means a minimum of two hours of working time in the morning before a sale is offered. Three hours' time is better.

It is important, too, that the *Notice of Sale* contains a statement defining the time of official award following the opening of bids. Immediately after the sale of bonds there is an order period ranging from one to three hours. During this period, most firms do not confirm any bond sales. Usually, there is a delay until the end of the order period so that if large orders are received from financial institutions they will get priority. Many of these institutions will not give an order until an official award has been made. On the other hand, if a large balance remains at the end of an order period, trouble may be encountered in marketing the bonds because many buyers feel that it has been an unsuccessful issue. This is the reason potential buyers like a quick award.

Investment bankers are concerned over the risk involved in the delay of the final delivery date. Sometimes actual delivery is delayed because of legal proceedings, printing difficulties, or other reasons. If this happens, the purchaser runs the risk of customer cancellations in an adverse market period. Every *Notice of Sale* should contain a clearly defined clause to the effect that a purchaser is granted an option to cancel his obligation and to receive prompt refund of a good faith deposit if the issuer fails to make delivery by the specified date.

After the district has received the money from the sale of the bonds, it must be accounted for in a manner prescribed by the laws of the state and the rules and regulations of the district. This money must be safe-guarded for the purpose for which it was intended. Many states permit these funds to be invested in short-term U.S. government securities until such time as they are needed for actual construction.

Other Methods of Financing

Other methods of financing schoolhouse construction are by aid from the state, private corporations, and/or the federal government. Several states use their bonding power to finance local school construction. This is done through loans, grants, and other methods.

California, Maryland, and Michigan are examples of states that assist local districts by selling state bonds. (Each state has slightly different regulations governing this procedure.) Loans to districts in California must be paid off within 30 years, and, any debt unpaid at the end of 30 years is automatically written off by the state. The district's annual payment to the state is for both principal and interest on the state's loan to the district, but no interest payments are required after 25 years. Maryland law requires that each school construction loan be paid in full with interest and that a sufficient annual levy be made on the property within the district to retire the loan. Michigan's plan for assisting local districts is quite different from that of California and Maryland. It has many desirable features and most districts take advantage of the plan.[4]

Several states have established revolving loan funds for aid to local districts. These funds are set up with monies from current revenues, special appropriations, and other sources exclusive of bond issues. Arkansas, North Carolina, and Virginia have such funds.

Direct grants from the sale of state bonds have been made to finance construction in South Carolina, Delaware, Vermont, and Washington. These states use their general credit to borrow money for school purposes and allocate the money to the local school districts.

Another group of states are more liberal in giving assistance to districts to meet debt service payments on their bonds. However, the local district must use its own borrowing power and issue its own bonds without the aid of a state bond issue.

New Jersey has authorized a fund to be used to purchase a school district bond issue when a default is anticipated or to pay interest on such bonds in the hands of outside holders so long as the district is unable to make such payment. New York has a special type of program for school building bonds. This measure gives relief to certain school districts which are compelled to pay an excessive interest rate on their bonds. The districts are eligible for such aid if the rate of interest they must pay exceeds one-fourth of one percent in excess of the average rate paid on similar bond maturities by those districts which have sold bonds in the previous six months.

---

[4] Educational Facilities Laboratories, *The Cost of a Schoolhouse*, (New York: EFL, 1960), p. 122.

Debt limitations force other states to use lease plans in order to obtain school construction. One of the first of these to be used successfully is the Kentucky "leaseback" plan. Under this arrangement a private schoolbuilding corporation is created for the benefit of the local district. The private corporation purchases the site, erects the building, leases it to the district, collects rent for its use, and uses the rent to pay back the principal and interest on bonds. When the indebtedness has been retired, the nonprofit corporation deeds the building to the district. This plan of financing has been used extensively in Kentucky and Indiana.

Pennsylvania has used the school building authority, both on the state and local level.[5] This plan is a result of debt limitations. The Pennsylvania State Public Building Authority combines the lease-rental plan of the corporation with state aid payments to the local school district. The corporation pays off the bonds from the proceeds of the lease-rental it has collected from the districts and then deeds the school building to the district. Although the bonds do not pledge the credit or taxing power of the district, they are tied to state aid payments, which gives them a better rating than those of the private corporation. If a district defaults on its payments to the state authority, the state is authorized to withhold from the district an amount of rental aid equal to the default, and to make such payment directly to the authority.

Some federal funds have been available for schoolhouse construction in various types of districts for a period of years. In the war years, only districts with urgent needs resulting from war-connected activities were eligible for federal funds for schoolhouse construction. Since World War II, districts materially affected by federal activity have been eligible for such funds through Public Law 815.

Summary

From the foregoing, it is evident that the school business official is becoming a key staff member in schoolhouse planning and construction. Three important aspects which need to be considered are: 1) the complexity of fiscal planning, 2) the necessity for long-range planning, and 3) the rapid change in educational programming. Therefore, the professional services of a school business official are essential if sound schoolhouse planning and construction is to be accomplished.

---

[5] Daum, Dr. Henry F. "Financing School Construction," *Annual Volume of Proceedings*, (Chicago: ASBO, 1961), p. 339.

CHAPTER II

Site

by LESTER E. ANDREWS
Business Manager
Iowa Western Community College
Council Bluffs, Iowa

The demand for increased educational opportunity for greater numbers of our citizens, both young and adult, continues to add to the problems of the educational institutions. One of these problems lies with the site of the school district. Districts are growing larger and faster, and vacant land continues to get scarce and very expensive.

The need for careful, planned, and systematic study in the selection, acquisition, development, and utilization of the school district property thus increases daily. This chapter will set forth a number of factors which should be considered in a carefully planned and systematic study of the site.

Selection

The first step in the acquisition and selection of property should be a review of the educational philosophy of the individual school district, resulting in the educational function which is to be fulfilled on the site. The intent of the district for its use should be rather specific, including the grade level of the students, the type of educational program to be offered, and the type of outdoor recreational and physical education facilities desired.

This educational philosophy should be reviewed by a consultant team including the board, administrative staff, faculty, architects, and the educational consultant. Once this educational team thoroughly studies and understands the philosophy, then it is time to proceed with the selection and acquisition of a site.

Factors to be considered and used in the analysis for comparison of various sites are numerous, including size, initial land cost, future availability of land, site access and location to contributing area, site topography and utlization, site grading, soil conditions, environment surrounding site, utilities, fire protection, external hazards and nuisances, site visibility for public relation purposes, approach and visual qualities, natural usable features, zoning, and transportation.

Site Size

Much has been written concerning the space needs for the site. It shall not be repeated here, except to remind those persons responsible to acquire sufficient vacant land in order to provide for the total educational program as outlined in the educational specifications.

Initial Land Cost

It has often been said that the best time to buy a site is now, thus indicating that the land purchase should be made as soon as possible after the need for such land has been determined. Although the land purchase price must be considered, it should be remembered that an available site improperly located, though inexpensive at the time of the original purchase, could prove to be rather expensive in the long run.

Future Availability of Land

The educational specifications should offer a reasonable answer as to the required size of the site; but, it should be remembered that school programs change, therefore, selection of the site should consider the feasibility of future expansion.

Site Access and Location to Contributing Area

The site shall be so located as to provide easy access and be available to all students of the area without creating undue hazards for either the vehicular or pedestrian traffic.

Site Topography and Utilization

Topography must be varied enough for maximum building interest, but not too limited for overall site development. Consideration must be given as to what percentage of the total area of the site can be used most effectively in the master plan.

Site Grading

A rugged terrain with considerable elevation differential, although offering some interesting possibilities for development, could prove rather expensive and should be given very careful consideration.

Soil Conditions

Foundation and subsoil drainage work can be very costly. It is recommended that soil tests be made on the site before purchase is finalized.

Environment Surrounding Site

The surrounding environment must be consistent with the proposed educational development of the site. It is mandatory that coordination with the other municipal government agencies, including parks, recreation and planning commissions of the city and county governments, be maintained at all times.

Utilities

Careful consideration should be given to the adequacy and availability of water, electrical service, gas service, and communications systems. The study should also include the determination of the process for sanitary sewage disposal.

Fire Protection

The availability of good fire protection and equipment, providing for the safety and security of the occupants may also qualify the district for a considerable savings in fire insurance premiums.

External Hazards and Nuisances

Care should be taken to avoid those areas which might be affected by smoke, dust, or odors created by industrial plants or other facilities in the area. The noise and congestion of concentrated vehicular traffic should be avoided. The site should be located away from the traffic patterns of any nearby airports, thereby eliminating the noise and hazards involved with this traffic.

Site Visibility

Beautiful and well-planned sites tend to develop a community's pride in its educational system. A site offering a maximum of external visibility from nearby streets and roads will serve as an excellent public relations tool.

Approach and Visual Qualities

The drive or walk to the school site should be in pleasant surroundings. Avoid surroundings such as junk yards, dumps, and other unsightly locations if at all possible.

Natural Usable Features

A survey may show a number of natural usable features that could be developed into the master plan for the site, including ravines for natural drainage; valleys and bowls that could be used for outdoor theatre-lecture areas and athletic events; and, the location of plateaus for playing fields and trees.

Zoning

Care should be taken to work through the proper authorities to determine that the site is located in an area that will be zoned and protected in the future from heavy industry or business. The proposed building should reflect the existing desirable features of the neighborhood. It would indeed be valuable to consult with the chief of police, fire chief, and traffic engineer relative to sidewalks, parks, water, sewerage, and utility facilities.

Transportation

Existing and planned streets and highways must be considered in the site selection. Provision should be made for bus transportation and daily student traffic. Existing roads should be capable of handling traffic to athletic stadiums, concert halls, and other school facilities that will draw heavy off-campus traffic.

Acquisition

Careful study of the factors to be considered in the process of site selection should offer the district a preferred site location. It is next recommended that three persons namely, an appraiser, real estate agent, and an attorney, be appointed to assist the Board in the acquisition of the site.

Appraiser — a certified appraisal of the preferred site should be secured to give the district an approximate purchase cost. The appraiser should be familiar with the current values of property in the area, including recent sales involving real property of like kind, and he should be qualified to submit an unbiased appraisal. If more than one parcel is involved in the total site acquisition, the same appraisal should be used for all parcels, thus creating uniformity in the purchase price.

Real estate agent — the services of a certified and licensed broker and realtor should be secured by the district to assist in the acquisition of the desired parcel.

There are a number of procedures for acquiring property, including condemnation, but it is preferred that the district make an offer to purchase the real property from the owner through a real estate agent. The purchase price is determined by giving careful consideration to the report of the appraiser and the opinions of the real estate agent regarding today's market, and the attitude of the sellers.

Attorney — an attorney representing the school district should be a member of the acquisition team from the beginning. The attorney should examine all legal documents, including titles, deeds, agreements, options, and offers to buy or sell. Once the negotiations have been initiated, it should be the attorney's responsibility to make a thorough search of all abstracts for easements, zoning, taxes, liens, ownership, and all other items prior to the actual purchase of the property by the school district.

Development

A school district should secure the services of a competent architect. The educational consultant, the chief educational administrator, and the business manager or official should confer with the architect to develop and prepare educational specifications upon which the school program is to be dedicated. The educational philosophy of the district and the purposes to be accomplished on the site should be given considerable analysis and study. The educational specifications provide a guide and assure the orderly and economical growth of the total site development. It further provides that all activities and developments on this site lead to the goal set forth in the learning facility. It will tend to eliminate duplication of facilities for future expansion. A master plan provides the community with the objectives of the school district.

A number of photographs, including aerial shots of the site, should be made. With these in mind, the architect can proceed to determine the location of the building or buildings in relation to other proposed functions of the site, such as recreation and athletic facilities, circulation for pedestrian and vehicular traffic, the design and location of parking areas, and landscaping.

Location of Buildings

The building or buildings should be so located in a pattern that will provide a visual unity with the surrounding facilities. Consideration must be given to the noise and activity levels of the other areas. Provisions must be made to facilitate the future additions or revisions to the building.

Recreational and Athletic Facilities

The desire for increased recreational facilities on behalf of the local community demands that care be taken to locate such facilities as tennis courts, swimming pools, archery ranges, and playground equipment in such manner that they may be used for a community recreation program without jeopardizing the school program. Athletic facilities, like a football stadium or baseball field, are best located near existing highways and roads in order to avoid traffic congestion.

Pedestrian and Vehicular Traffic

The location of walks and drives will depend a great deal upon the location of the building, but it is suggested that sidewalks and drives be placed where people will want to use them. In more or less straight lines, drives for vehicular traffic should be located to avoid a conflict with pedestrian traffic. The major function of driveways and walks should be to allow persons to proceed across the site with maximum efficiency.

Design and Location of Parking Areas

The existing plan of streets and roads must be taken into consideration when developing the school site. The various functions to be served on the site must be studied and parking lots should be located to permit easy access to the destination of the student or visitor. Parking lots should be constructed to avoid detracting from the general beauty of the area.

Landscaping

The existing features of the site must again be analyzed. It should be decided how these can be coordinated with the master plan. This should include the location of trees, ravines, and drainage, including ponds, the topography of the land, and the existing features surrounding the site.

CHAPTER III

Relations With Architects

by LLOYD V. LONG
Business Manager
Winnetka Public Schools
Winnetka, Illinois

Selecting an Architect

Before the Board of Education can select an architect it must consider and answer several questions, namely:

1. Does the size of the school require a large architectural firm with many specialists?
2. Must the architectural firm be well known?
3. Will the community expect a local architect to be given the assignment?
4. Will the proposed school include special educational facilities?
5. Is the proposed bond issue adequate to finance the project? Or must the building be strictly a low cost structure?
6. Will creative ability in design and appointment be a major factor in the selection of the architect?

What are some of the advantages and disadvantages one can expect depending upon the selection? The large architectural firm has much to offer in experience, talent, flexibility, prestige, and manpower when working with the owner and contractors. This size and multiple manpower can also work to a disadvantage when time is important. The smaller firm cannot have the wide experience upon which to draw but will no doubt operate as a closely knit team with easy interoffice cooperation, thus saving planning time and making changes and revisions with minimum effort.

The availability of the architect is most important. Here a local firm has a tremendous advantage. When the administration and the architect can quickly get together for exchange of information and the study of plans, there will be less need for changes and revisions later. The use of the telephone for construction reporting may loom as a significant budget item for a small school district, but when considered as part of the total building cost, it is relatively small and probably saves many times its cost.

Before a school design or selection is made, the board and administrative staff should visit schools designed by the architect. They may secure opinions from other school board members and administrators concerning the architect's attitudes and abilities.

In order to better prepare the Board membership and administrative staff on final specifications and drawings, the architect should prepare and submit an advance cost estimate for budget analysis of total costs to build. This estimate will generally approximate somewhere between the low and high bids, although most architects will make estimates based upon square foot costs of construction.

Educational Specifications (see also Appendix A)

As preliminary plans for new construction take dimension and shape following conferences with the teaching staff, department heads, principals, and administrators, the role of the school business administrator becomes that of a liaison between the school and the architect. It is his prime responsibility to establish and maintain adequate communication as details are brought into the plans.

Minor items in construction or equipment requests often become very important in the eyes of the staff and in the operation of the plant. Although it is unwise to create innovations, permit fadism, or custom-build for individual whims, many of the details suggested are the results of experience and acceptance over a period of time. These must be evaluated, and, if acceptable, should be forwarded to the architect early in the planning stage before his working drawings are started.

The business administrator and his maintenance personnel are well aware of deficiencies, omissions, problems, strengths and advantages in their present plants. A listing and evaluation of these for the architect can guide him in designing an acceptable school. A file copy of these suggestions in the business office serves as ready reference and as evidence of proper communication.

The more specific one can make these recommendations or requests, the less chance there will be for misunderstanding. The business administrator should remind both the architect and the educational administrative staff that supply and equipment storage space should be provided, that safety measures must be installed, that the community use of the plant imposes special details for consideration, that the placement of corridors and rooms must provide a free flow of traffic for the school program, that deliveries must be received and dispatched without interruption to the school, and that economics must not be at the expense of everyday maintenance.

Standardization of Hardware and Fixed Equipment

Standardization of construction items such as hardware, building equipment, plumbing fixtures, light fixtures, and so forth, provide savings, not only in the initial construction, but also in the continuing maintenance of the plant.

Storage and inventory control of replacement items is usually a problem for each school. Whenever it is possible to standardize and limit the number of replacement kits and special tools, definite savings will accrue.

Overemphasis on standardization, however, may result in inflexibility and resistance to change with resultant obsolescence in some cases. Standardization does not mean closed specifications. The use of brand names may be indicated, but other brands of equal quality should be permitted in the specifications.

Bidding Laws

The instructions to prospective contractors will vary because of different state laws, the size of the project, local practices and past experiences.

Most districts are required to advertise in newspapers or periodicals for construction bids; others will invite only a limited number of selected contractors. Where this is permitted, the architect may assist the school board with an evaluation of contractors with whom he has had a previous working relationship or knowledge of the firm's workmanship.

Three types of construction bids emerge as possibilities:

(a) The general contractor will submit one bid covering all details contained in the specifications. He will select and direct the sub-contractors as needed.

(b) General contractors and the principal mechanical contractors (usually plumbing, heating, ventilating and electrical) will be asked to submit their bids directly to the Board of Education. Instructions to the bidders specify that the successful mechanical bidders will act as sub-contractors and work with and under the direction of the general contractor selected.

(c) A general contractor can, where regulations permit, be selected and authorized to proceed on a time and material basis.

It is obvious that a general contractor will prefer to select his own "team" of sub-contractors usually from companies with whom he has had successful and satisfactory experience. In such situations, the general contractor must accept full responsibility for each sub-contractor and pay each per their agreement.

In large construction jobs and in communities where local companies can qualify, it may be advantageous and expedient to invite bids as outlined in (b) above.

Where time is a major factor and a general contractor of unquestioned ability and integrity is available, the architect, contractor and school board may (where laws permit) draft a contract based upon time and material plus overhead and profit. The hazard here is in the unknown total cost. Local financial circumstances will dictate the advisability of this type of contract. The school business administrator may feel the need for closer cooperation with the architect since this contract provides for more flexibility in solving unforeseen problems or in expediting change orders. This contract is often used for remodelling old schools.

Alterations and Change Orders

Seldom is a structure completed without some change or alteration to the original plan. When it becomes necessary to make a change during the course of construction, the architect is required to investigate and to issue a "change order" to the contractor outlining the details involved and the resulting additional cost or credit. To become effective, the change order must be approved by the architect and the school official, authorized by the school board and submitted to the contractor for action.

School personnel seldom realize the cost and complications resulting from a seemingly simple change order request. For instance, moving a non-bearing wall two feet over is no problem in the sketch-planning stage; however, after working drawings have been completed, this request could involve many trades and sub-contractors such as plumbing, electrical, heating-ventilating, acoustical treatment, light fixtures, duct work, floor coverings, etc. All parties concerned must be contacted and have an opportunity to re-figure their costs in the proposed change. The resulting "change order" usually is a time-consuming, costly item and should be avoided whenever possible. This procedure is usually followed, however, whether a revision is large or small; the important factor is that the line of communication remains the same at all times: school business administrator — architect — school board — contractor.

CHAPTER IV

Guarantees

by **FRANK F. ZELIP**
Assistant Superintendent
Board of Education
Cicero, Illinois

Surety Bonds — Contractors' Bonds

Surety bonds of building contractors provide school boards with essential protection of public funds and allocations for a contemplated school construction program.[6] Unnecessary costs and losses through bidders' defaults are avoided with the provisions set forth in building contract specifications.

School business officials everywhere should insist that contractors furnish a Bid Bond when submitting proposals for public building or construction work. Insurance companies which are licensed and authorized to conduct such surety business are engaged by the contractor in guarantying that, should said contractor be accepted as the successful bidder, contract documents will be promptly executed, and bonds filed in an amount equal to 100% of the contract price for faithful contract performance and full payment of labor and materials.[7]

The Performance Bond assures the Owner of financial protection against failure by the contractor to complete the building as designed and to make good on defective workmanship and other contract provisions. The Labor and Materials Payment Bond protects all persons supplying labor and material in the prosecution of the work provided for in the contract.

These contract bonds also serve as credit guaranties. The surety extends its resources and its credit to the contractor's covenants, for the ultimate benefit of the school district. The contractor is able to obtain larger and freer credit from material suppliers and sub-contractors, thus resulting in more favorable prices through elimination of credit risk. Also, through such an arrangement, fabrication and shipment of materials are expedited.

[6] Engelhardt, Engelhardt, & Leggett, *School Planning and Building Handbook*, (New York: F. W. Dodge Corp., 1956), p. 524.

[7] *Ibid.*, p. 525.

Failure of school boards to require the statutory Surety Bonds may raise questions concerning their competence as a corporate body of liability as individual board members.[8] There is variation among courts regarding individual liability of board members when the statutory bond is not provided. In order to avoid questions and comply with the law, a Performance and a Labor & Materials Payment Bond should be secured.

A Florida case[9] illustrates recent holdings which accept the view of making board members individually liable. The statute provided that the contractor "shall be required . . . to execute the usual penal bond" and, "to protect laborers and materialmen . . . the school, and school funds involved." The contractor gave no penal bond; and action was brought against the official bonds of board members. The court held that failure to take the penal bond was a breach of duty and that "persons suffering loss because thereof had a remedy against such board members individually in tort."

The owner is likewise urged to arrange for a Builders' Risk policy which in essence protects the contractor and school district from damages incurred by fire, windstorm, explosion, and vandalistic acts upon the building or premises during the construction phase of the program.

Guaranty and Warranty Defined

In the normal course of schoolhouse construction work it behooves school board members, administrators, and other public officials to be concerned and informed about the guarantees of contractors and the warranties of manufacturers or suppliers. Of most importance to all owners is the fact that the contractor shall guarantee and deliver a completed building facility and/or plant, "in accordance with approved plans and specifications of the architect" within a reasonably stipulated time for a definite contract sum.

The usually stipulated period of contractor guarantees by most trades is one full year from date of completion and/or acceptance. It is during this subsequent one year period (or other stipulated term) that Owners have every right to require of contractors and their sub-contractors the fulfillment of obligations and guarantees for satisfactory workmanship and materials. This should be clearly expressed in the specifications with the notation that any such workmanship and/or materials shall be provided at no extra cost to the Owner.

Certain building trades, such as the roofing industry, may offer a 20-year guaranty or warranty on roof materials provided application is done in accordance with manufacturer's directions. Although it may be implied, the coverage may be much more limited and restrictive. In the Chicago area, members of the Roofing Contractors' Association issue only a 2-year guaranty on workmanship and materials.

---

[8] Lee O. Garber, *Law and the School Business Manager*, (Danville, Illinois: Interstate Printers and Publishers, Inc., 1957), pp. 158-159.

[9] *Warren v. Glens Falls Indemnity Co.*, 66 So. (2nd), 54, Florida, 1953.

School business officials should insist upon securing whatever guarantees are expressed in the Contract Documents. Also, printed certificates, warranties, instructional manuals, descriptions of equipment, and the like should be issued to the Owner or his representative. Complete operating instructions and demonstrations by contractors or equipment representatives should be given to the building maintenance and operating staff members prior to or at completion of the construction work. Contract Documents applicable to school construction refer to the Agreement, General Conditions of the Contract, and Drawings & Specifications, including approved revisions.

The difference between a guaranty and a warranty tend to be nebulous down to and including the fine points of law.[10] A guaranty and a warranty is each an assurance (sometimes implied but more often expressed) in a written contract that the workmanship or the merchandise in question is of a certain quality and that a certain amount of service can be expected from it. The assurance is such that if quality and/or performance fail, the seller or guarantor will do something to compensate the buyer. Specific differences in legal responsibility, however, vary from state to state. Hence, the differences between a guaranty and a warranty exist because of the manner in which contract terms are spelled out.

A guaranty is breached after the contract has been entered into, and after the product fails in service.[11] A warranty is considered breached at the time the contract is entered into, if the product does not meet the represented specifications.[12]

A guaranty usually implies surety of the guarantor. It is a collateral agreement, whereby, if the principal obligor (seller) fails to meet his obligation in backing up his material or merchandise, a third party will accept the obligation and compensate the buyer as promised by the seller.

On the other hand, a warranty is a collateral contract solely between the guarantor and the buyer. Responsibility for compensation in this contract rests completely with the guarantor. The guarantor in a warranty contract usually agrees to repair or replace defective parts, and sometimes provides periodic service. Express warranties by a manufacturer are generally made on labels or in advertising and sales literature.[13] Other sellers, such as dealers, warrant orally or in the invoice of sale. No specific intent to warrant need be shown, if the statements or claims would lead a buyer to believe such claims were made to induce a sale.

---

[10] "Guaranty or Warranty – Is There a Difference?" *Architectural and Engineering News*, (January, 1964), p. 57.

[11] *Ibid.*

[12] *Ibid.*

[13] "Product Liability," *National Paint, Varnish & Lacquer Association*, (April, 1962), p. 9.

In the absence of an express warranty, manufacturers are generally subject to laws creating implied warranties. Where goods are bought by description from a seller, there is an implied warranty that the goods shall be of merchantable quality. The general rules with respect to damages for breach of implied or express warranties are set forth in the "Uniform Sales Act" which prevails today in 35 states. Under said Act, the measure of damages for breach of warranty is the loss directly and naturally resulting from the breach.[14] The measure recoverable is the difference between actual value when delivered to the buyer and value if it had conformed with the warranty.

Analysis of Contract Documents

Being agents of the state, boards of education have no inherent power to contract; however, like all other state agencies, their contractual powers are conferred upon them by statute either expressed or implied. Therefore, a contract violating a statute or not authorized by statute is null and void. It follows that a school board must itself, acting as a board and in its corporate capacity, enter into contracts if they are to be binding; it may not delegate final authority to enter into a contract to its superintendent, business manager, or one or more of its own members.[15]

Courts interpret a written contract as they find it, always assuming that the contracting parties included in it their mutual intentions. Courts will not permit oral or extrinsic evidence to be introduced to contradict, vary, add to, or subtract from the meaning of the written contract. Statutes frequently authorize a school board to enter into contracts but prescribe the manner or mode of making the contract.[16]

Contracts falling outside of the scope of a board's authority are generally known as *ultra vires*. Contracts in excess of the statutory debt limit are ultra vires in the primary sense. Examples of ultra vires contracts in the secondary sense are such as contracts to employ dentists or physicians for the treatment of children, and contracts to provide pupils susceptible to TB with free lunches and sleeping garments to be used in open air classes.[17]

As noted elsewhere in this chapter, Contract Documents consist of the Agreement, General Conditions of the Contract Work, and Plans and Specifications including all revisions thereto. Signatures in duplicate shall be appended to all Contract Documents by the Contractor and the Owner for official record purposes.

---

[14] *Ibid.*

[15] Garber, *Law and the School Business Manager*, pp. 26-27.

[16] *Ibid.*, p. 29.

[17] *Ibid.*, p. 31.

Certain general principles of law governing contracts should be guidelines for school board contracts:

- a contract to be binding must be entered into by parties who have the legal capacity to make it.
- there must be a mutual meeting of the minds of parties to the contract.
- a contract must be sufficiently definite in its terms to be enforceable.
- an agreement will not constitute a contract unless it is based upon some valid consideration. (A mere promise will not be construed as a contract.)
- an agreement which violates a statute on principles of public policy will never be regarded as a contract. Contracts are made in contemplation of the statutes governing them.

"As Built" Plans

Memories fade. Changes are made. People move about. Some die. For these and other reasons, the exact locations of various structural, heating, plumbing, electrical, and other building items need to be pin-pointed for future reference in the revised and final "as built" drawings and specifications of the completed job. Contractors may find a need to make field changes during construction. Such changes should be approved by the Architect and Owner before proceeding.

It is most essential, therefore, that the Owner insist upon and receive a complete, revised set of plans and specifications of the schoolhouse or other facilities "as built" from the Architect's office upon completion of the work. Any and all changes, deletions, additions, and/or transfers of location of items or workmanship details should be noted and reflected in this master set of construction plans.

The Contractor shall be held responsible to the Owner for any defects of workmanship or materials which occur within a period of one year from date of completion. He shall repair or replace and make good such defects upon due notice being given by the Owner. At the time of final payment, the Contractor shall provide the Owner with releases from all liens arising from the contract work, including those of sub-contractors and suppliers.

CHAPTER V

Environment

by DR. N. L. GEORGE
Assistant Superintendent
Oklahoma City Public Schools
Oklahoma City, Oklahoma

A school building of necessity needs foundations, floors, walls, and a roof. The internal part of the building must be attractive and comfortable to have a stimulating environment. To achieve the desired environment, the factors of sonic, visual, and thermal must be carefully planned.

Sonic

In planning a school plant, whether it be closed or open design, the sonic design objectives include:

(1) effective sound insulation of individual rooms;

(2) prevention or reduction of sound propagation from one activity to another;

(3) elimination or reduction of sound interference from external sources;

(4) establishment of acoustical balance when good hearing is required or reduction of sound intensities where noise reduction is the objective; and

(5) reduction of unwanted sounds, both in rooms where quiet is desired and in spaces through which unwanted sound may travel to quiet or critical areas.

Probably the most important information a school business official should consider concerning sonic conditions is the nearness of the site to flight patterns. Its nearness to noisy streets and thoroughfares also needs checking. Both of these location problems will augment or decrease the sonic conditions which may be evident in school buildings.

As the business official works as a member of the team, a knowledge of the usage of the areas is very important. Some areas are quiet zones while the uses of other areas may produce many unwanted sounds. The location of musical activities, shops, and specialized areas is very important. Usually the noisy areas can be separated from the quiet areas by the location of these areas within the total structure or by the thickening and special treatment of surfaces within the structure.

The penetration of the surfaces by mechanical pipes and ducts is a very important consideration. The porosity of materials used as surfaces (including floor covering), upkeep, maintenance, resistance to damage and wear are construction items which will increase or decrease sonic conditions and also increase costs if proper study is not made. The materials used should also have esthetic value. Usually the effectiveness of sonic conditions depends upon the manner in which the acoustical materials are used or misused.

Expert knowledge of acoustical conditions is the responsibility of the capable designer. The business official must rely on his knowledge of how to control wanted and unwanted sounds. The goal should be to isolate, eliminate, or absorb the unwanted sounds. The unwanted excessive noises inhibit good hearing by creating distractions.

The proper location of a school plant, the careful division of and/or arrangement of the noisy and quiet spaces within the building, the selection and use of the materials for the surfaces of the different functions, and the planting of trees, bushes and shrubs on and around the site are positive aspects of sonic environment.

The Visual Environment

Brightness balance stresses the ability to see comfortably, quickly, and accurately. This concept represents a discriminating and broad approach to the development of the seeing conditions by providing light in varying quantities throughout the structure.

Basic considerations of design problems encompass what the eye sees and what the task sees under given lighting conditions. Glare, both direct and indirect, becomes a problem. This concept of brightness-balance stresses the correlation of values of brightness difference and brightness patterns with values of lighting levels and varying tasks.

The visual problems are closely related to the spatial, the thermal, the sonic, and the aesthetic factors. The illumination factor alone cannot determine the effectiveness of the seeing processes and the proper functioning of other building design elements.

The basic lighting principles which are to be applied against any lighting design include:

(1) The brightness relationship of the various surfaces in the entire visual field must be kept within recommended limits.

(2) The brightness of the sources of light should be exposed toward work so seeing is not hindered by reflections from the detail of the task, not from the background.

(3) The levels of illumination (quantity in terms of foot candles) must be related to the visual task to be performed and the design of the lighting system producing the light.

(4) All factors remaining constant, visual performance increases with the brightness of the task.

(5) The process of seeing typical school tasks requires appreciable amounts of physical energy, the amount of which is difficult to determine.

Solutions to critical seeing must consider brightness created by electric and daylight sources. The guides for comfortable seeing by the use of electric lighting systems as outlined in the *American Standard Guide for School Lighting*[18] need to be thoroughly understood in the selection of lighting systems. When the daylight source is used, the windows must be shielded. The problem in construction is to secure the proper balance.

A general knowledge of the reflection factors of all surfaces used within the classroom is a basic concept which should be understood to achieve the desired goals. Very important is the recognition of the brightness of objects within and without the classroom as these brightnesses affect the total visual comfort. The selection of the colors of paints for surfaces, the selection of the reflectances of surfaces for furniture and equipment, and the control of glare, both direct and indirect, should be carefully studied as the lighting systems are selected for a new or an old school room.

The total field of visual environment is very technical. The developments within this area of school construction have been rapid in recent years. The wise school administrator will make his basic decisions on the counsel of an efficient illuminating engineer.

---

[18] American Standards Association, *American Standard Guide for School Lighting*, (New York: Illuminating Engineering Society, Publishers, 345 E. 47th St., New York 17, 1962).

The Thermal Environment

Proper thermal environment control is an essential requirement for modern school buildings. All the aspects of a specialized environment related to the combined effects of radiant temperature, air temperature, humidity, and air velocity are involved.

"Optimum thermal conditions for students will vary according to their age, sex, physical activity, health, clothing density, and adaptation to local climate"[10] is a concise statement of the total problem.

Other factors which influence comfort include the removal of odors, dust, dirt, smoke, exhaust fumes, chemical fumes, and the like.

Certain goals of air temperatures should be sought. First, the air temperature due to equipment going on and off should not be more than ±1°F. and probably less. Second, room air temperature should not vary more than ± 1° F. vertically or horizontally up to a five-foot level and to within one foot of exterior walls. Third, air motion within occupied space will, at the sitting level, provide air velocities ranging from 20 to 50 FPM (feet per minute), and fourth, all air supplied to occupied spaces should be passed through cleanable or replaceable air filters to reduce the air-borne dust.

Systems should be activated by separate automatic timing devices. This provision is basic to the problem of shifting temperature loads.

Each thermal environment system must contain such safety devices that will control the particular installation by the designing mechanical engineer and the concerned school personnel.

In the designing of a building for optimal thermal conditions, the architect should plan to insulate the structure from the effects of the weather. A very important consideration is solar control. Proper planning of these facets should result in reduced first cost, operation cost, and operations problems.

Care should be taken to ventilate all the individual spaces in a building. Each space should be treated according to its use. Separate exhaust ventilating facilities are needed in many areas. Care should be taken that the exhaust provisions exceed the mechanical supply volume.

The heating and ventilation system should be designed to accommodate the desired percentage of fresh air intake. This condition is related to outside temperature and should be increased in percentage with the rise of outside temperature.

---

[10] *National Council on Schoolhouse Construction Guide for Planning School Plants*, (East Lansing, Mich.: National Council on Schoolhouse Construction, (1964), p. 115.

The most common types of heating and ventilating systems include direct radiation, panel heating, unit ventilators, warm air furnace systems, central or blast systems, and split systems. The last four systems will perform effectively only when the fans are in operation.

Adequate temperature controls are essential. Controls depending on the local systems may include individual room, zone, day, night, day-night, boiler, furnace and burner controls. Automatic controls may be electric or pneumatic.

CHAPTER VI

The Use of the Critical Path Method in Schoolhouse Construction

by DR. HENRY F. DAUM
Secretary and Business Manager
Abington School District
Abington, Pennsylvania

During the 10 years since its discovery in 1957, there has been a rapid growth in the utilization of the Critical Path Method, known as C.P.M., for planning and scheduling building programs and projects. School building administrators anxious to speed up their school building programs might well look to C.P.M. for help in this construction. C.P.M. was originally devised to aid a large private corporation in streamlining its building construction program, and to reduce the time taken for changeover of complex industrial processes. The initial experience in that corporation was highly successful, and repeated experiences with C.P.M. have likewise been successful.

What Is the Critical Path Method?

C.P.M., otherwise known as the Critical Path Method, is one of several methods for planning construction projects and other types of projects more efficiently and effectively. While it was developed for use in large complex processes in which the computer could assist in the analysis of the planning, the method is equally useful in small projects where a computer may not be needed to make the analysis that will produce the desired results.

Today the C.P.M. system and comparable systems, such as P.E.R.T., are in widespread use in government and industry as well as in public building projects such as schools, colleges, hospitals, and the like. These methods of construction planning and scheduling are based entirely on the detailed logical analysis of a project into the component separate activities which make up the total project, and the arrangement of each activity in its proper sequence with respect to the other activities.

When time durations are known or assumed for each activity, it becomes possible to determine the length of the total project, the activities which are critical in terms of the time schedule, the activities which are not critical, and other related information.

Analysis of the logic of the sequence of activities may lead directly to ways in which work may be shortened, unnecessary steps removed, certain activities speeded up, and others carried on concurrently. If the analysis should show the total project running beyond the time allowed for completion, steps may be taken to reduce the total time, either by increasing the staff available for doing the work, or by taking other measures which may improve the performance on the job.

The Working Tools of the Critical Path Method

The basic working tools of C.P.M. are the arrow diagram, sometimes called the network, and the printout or listing of tasks in their sequential order.

The arrow diagram is the graphic model of a project from start to finish. Each activity is represented by an arrow in which the tail represents the beginning point of the activity, and the head the finish of that activity. The logical arrangement of arrows in sequence and groups will show for each which arrows proceed it, which run concurrently, and which must follow.

Each arrow is given a title which describes the activity in simple terms. The beginning or tail of the arrow is given a number, depending on its proper position in the total sequence, and the head of the arrow is given the next higher number. The time duration of the activity is estimated either empirically or with direct assistance from the contractor or other specially qualified person.

It is evident that if we know the starting date for the entire project we can then derive the starting date for each of the activities in the network, assuming correct logic and no unforeseen changes in the sequence. Each activity arrow could be given a starting date and a finishing date.

The actual diagramming process requires careful analysis based both on logic and experience to assure the proper arrangement and sequencing of the arrows.

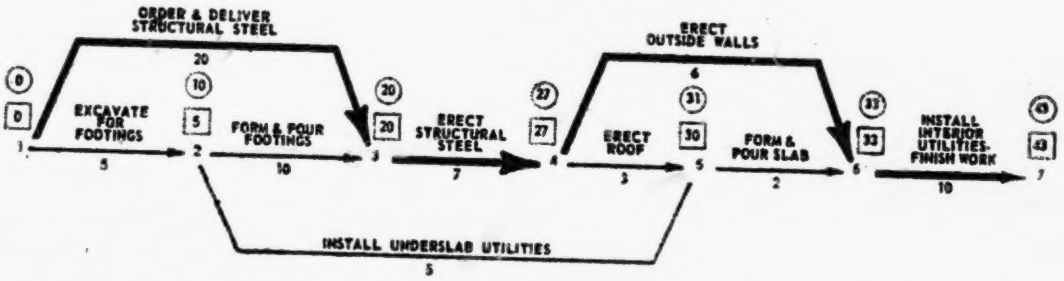
During this process, discoveries are made of any logical inconsistencies which, if undetected then, may create delays later. Problems of coordination are defined so that proper decisions can be made ahead of time. Unrealistic time schedules are uncovered in time to permit corrections to be made.

Applying this method to a multi-structure building program of a large school district may immediately disclose such information as the following:

The program just can't be done in the time allowed, no matter what steps are taken. The program could be done in the time allowed if present staff were doubled – or part of it doubled. The decisions basic to the start of the program have not been made in time to allow for timely completion. The time required for state approvals and/or Board deliberations has or has not been included in the schedule.

Obtaining this information early in the game permits everyone concerned to plan better and schedule more effectively.

Figure 1 shows a portion of an arrow diagram for a school building project.



The second tool of C.P.M. is the sequential list of activities in the order in which they must be started for the project to be completed on time. This is frequently referred to as a printout if a computer was used to analyze the data. On very small projects this listing can be made by hand, as the analysis need not be made through a computer.

Both the arrow diagram and the printout are useful in the planning of the project, and become useful in the management of the project once work is undertaken. Below is a printout (simplified) derived from Figure 1.

JOB NUMBER	DURATION	JOB DESCRIPTION	EARLY START	LATE FINISH	TOTAL FLOAT
1-2	5	Excavate for footings	6/ 1/64	6/12/64	5
1-3	20	Order and deliver steel	6/ 1/64	6/26/64	0
2-3	10	Form and pour footings	6/ 8/64	6/26/64	5
2-5	5	Install underslab utilities	6/ 8/64	7/14/64	21
3-4	7	Erect structural steel	6/29/64	7/ 8/64	0
4-5	3	Erect roof	7/ 9/64	7/14/64	1
4-6	6	Erect outside walls	7/ 9/64	7/16/64	0
5-6	2	Form and pour slab	7/14/64	7/16/64	1
6-7	10	Install interior utilities – finish work	7/17/64	7/30/64	0

Each of these tools should be updated from time to time. The changes that are made in the field should be incorporated on the arrow diagram, and these changes should be represented in the printout or new listing of jobs as they now will occur. Experience has disclosed that frequent reference to both the arrow diagram and the printout by all parties to the project leads to far better coordination of effort, and a far clearer understanding of the responsibilities of each of the parties to the project than was otherwise obtained prior to the use of C.P.M.

How to Obtain C.P.M. Service

The school administrator who wants to use C.P.M. in connection with a building project, or in connection with a broad scale building program, should get in touch with one or more of the consulting services now available in various parts of the country which will furnish C.P.M. service for a fee. This service is in the nature of a professional consulting service. Those rendering the service are qualified by experience and training in the building industry, and are able to assist in analyzing the various parts of a construction program or a construction project into the component activities.

School administrators in very large cities may well look to the possibility of creating their own C.P.M. team. The skills of C.P.M. analysis and diagramming can be learned in a period of several days under proper instruction. Thus it is possible that adequate C.P.M. service for a large city school district could be rendered by training one or more members of a staff who may be thoroughly familiar with the construction industry in all its facets. However, most school districts will employ consultants.

What Can You Expect of the C.P.M. Consultant?

The C.P.M. consultant will provide some or all of the following services as a normal part of his consulting schedule. Other services are available and may be included in the contract if desired for the particular project. The number and types of services will, of course, govern the fee to be charged the district.

1. *Develop a project schedule.* Working with the school and drawing upon the consultant's experience, he will develop a total project schedule, which includes all of the significant tasks from the inception of the design effort to the occupancy of the school. Key milestone dates will be established which represent the targets that must be attained.

2. *He will develop a design schedule.* The consultant will work with the architect to develop a plan and schedule for the design work. This may include the development of a series of schedules from which a selection of the one to be followed will be made. These schedules will be used then by the architect and the school district to check on the progress of design.

3. *He will maintain the design schedule in a current condition* by reviewing the steps that have been taken each month, and incorporating the successes or failures in new schedules. The updating of the design schedule will include the preparation of a status report showing a listing of the critical jobs that must be started and completed within the next report period, and a general analysis of the status of the project.

4. *Develop a preliminary construction schedule.* The consultant will prepare a preliminary schedule of the construction work when the design phase of the project is sufficiently advanced that the major features of the building are determined. This will enable the architect and the school district to place in the specifications a series of key dates, or milestone dates, which must be met by the contractors. This plan and schedule will be in the form of an arrow diagram and a computer based printout, which will be included in the specifications sent to bidders, and upon which they can base their bids.

5. *Prepare C.P.M. specifications.* The consultant may prepare a specification for the use of C.P.M., which specification will contain a statement of the function of the consultant and his relationship to the various contractors. This specification is included in the general bidding specifications to be sent to bidders, and will provide a basis for them to understand how C.P.M. service will work in conjunction with them when the construction contracts are let. This specification represents the basis of the contract between the School district and the consultant.

6. *Develop a complete project schedule.* As soon as the contractors are selected, the consultant will work with the contractors and the architect to develop a complete porject schedule which will be up to date, and which will reflect the contractors views as well as the architects views with regard to how the work is to progress. This schedule would include separate schedules of dates for the following:

> All work operations, procurement, letting of sub-contracts or revisions thereof, key temporary facilities, need for design information, shop drawings and materials, and a date of moving into the building. If the schedule as originally designed does not meet the needs of the project redesign occurs until the schedule does meet the needs of the project.

7. *Maintain construction schedules in a current condition.* As soon as construction begins, the consultant works with contractors, the architect, and the owner's representative to keep abreast of the job. Each month, and sometimes oftener, the consultant will review the detailed status of all the work with the contractors concerned, and with the architect and owner's representative. Modifications that have been brought about by changes in weather, or other reasons, will be incorporated in the arrow diagram, and computer runs will be made incorporating the new information. Based on this work,

the consultant will present to the owner and all parties concerned, his analysis of the project end date, and the interim key dates; a new listing, or revised listing, of all the critical jobs; a listing of all the jobs that must be completed with the next month for the project to remain on schedule; and his suggestions for possible improvement in the construction schedule. Acting in this capacity the consultant serves as a staff advisor to the school administrator. He is not a policeman or strong-arm man for the school district nor for the architect. He must be completely objective in his appraisal of the project conditions, and in so doing will provide maximum service to all the parties concerned.

The use of the C.P.M. method makes possible the production of numerous schedules other than those listed. For example, the school district may wish to invest funds to maximum advantage during the course of construction, drawing only that money which is needed to pay the contractors from month to month. The C.P.M. method permits an analysis of the construction progress in terms of costs. As this analysis is made, it becomes evident that the cash flow required to pay the contractors can be charted carefully, and hence the investment similarly charted with great care.

What Should C.P.M. Cost?

There is no hard and fast rule as to the probable cost of C.P.M. consulting service. A rule of thumb might well be that C.P.M. consulting service would cost one half of 1% of the construction cost of the project. This, of course, would not hold true necessarily for the planning of large construction programs. In connection with large projects the cost may be less than one half of 1%, and in connection with smaller projects the cost may slightly exceed one half of 1%.

At present it can be said with some degree of certainty that whether the contractor furnishes the C.P.M., or whether C.P.M. service is purchased on a consultant basis by the school district, the school district will pay the cost.

As time passes, and C.P.M. becomes more popular, contractors are beginning to acquire computers of their own, and are setting up C.P.M. programs to guide them in their own work. In such cases, it is conceivable that C.P.M. service may be provided by the contractor as an integral part of his work, and may not result in additional cost to the school district. The rapid growth and use of the C.P.M. as a tool since its inception in 1957 points clearly to the possibility that within the next few years its use will be common in the building trades, and it is conceivable that many contractors will not bid a job on which C.P.M. is not being used.

Is There a Size Limit to the Jobs in Which C.P.M. is Used?

There is no size limit to jobs in which C.P.M. may be used. However, it seems quite unlikely that consultant help will be employed with any degree of economy in projects costing less than $1,000,000 or $1,500,000. Here again, no hard and fast rule can be laid down. One of the factors which would influence a decision to make use of C.P.M. on the smaller jobs would be the extent to which the project needs to be rushed to completion in order to meet a deadline date. The more urgent the necessity for the completion of the project, the more likely it is that C.P.M. will provide a means to accomplish this result. The larger and more complex the job the more likely it is that C.P.M. can be justified on the basis of time and money saved.

The Usefulness of C.P.M.

The usefulness of C.P.M. to the school administrator depends upon a number of variable factors.

First, it depends upon the quality of the C.P.M. service. This service by consultants or others is not a uniform commodity always the same. It should be clear from the prior description that while the procedure follows an established pattern, the skill, knowledge, and intelligence which the C.P.M. consultant brings to the analysis of the project has a great deal to do with the usefulness of the output. The author has experienced widely different quality levels of service from the same consulting firm, on different projects, using different personnel for the analysis.

To counteract this, the alert administrator should review the C.P.M. arrow network and printout to familiarize himself with the logic adopted, the critical time schedule, and other pertinent information. Don't hesitate to ask pointed questions of the consultant, or suggest possible improvement for consideration. Insist on clarification of details if necessary, to assure yourself of the validity of the plan and schedule. Be certain to check for omission of key steps in the schedule, particularly if the C.P.M. schedule covers the planning stage of the building project.

The usefulness of C.P.M. service depends upon *how* it is used. The usual school building project involves several groups of people, each working from a different approach with sometimes widely diverse objectives. The architect and his staff, the Board, the Superintendent, the Business Manager, the school Principal, the teacher, the contractors, and sometimes citizen committees and others, all have a part in the project. C.P.M. can be of tremendous value in uniting all concerned in their attention to the time schedule for the project. Delay is a universal factor in school building projects, and by providing a meaningful time schedule where none would otherwise exist, C.P.M. provides perhaps the best vehicle for reducing delay to the minimum.

If, on the other hand, the C.P.M. schedule is used as a weapon against one or more of the participants in the project, it loses value, as it does if the consultant ceases to be objective in his analysis.

The usefulness of C.P.M. depends in part on the timeliness of its initiation. We can't expect to gain as much from its use if it is brought into the project too late. If it is to be used in the planning phase first, and then the construction phase, both of which consume about equal time in the project, then the consultant should start to work as soon as the project is initiated, perhaps before the architect is selected. If it is to be used only in the actual construction, then the consultant should be brought in as soon as the working drawings and specifications are begun.

C.P.M. is of greatest potential value on projects where there are several prime contractors each jealous of his own rights, and unwilling to subordinate his schedule to any of the others. Here the truly objective, highly skilled consultant can be of tremendous value in helping create one single plan and schedule to which all can adhere willingly, since it is the product of the consultant and not one of the contractors or the owner or the architect. When all parties respect and approve of the schedule and work for its improvement during the project, the resultant teamwork pays great dividends in time saving.

The writer has used C.P.M. consulting service on several school building projects ranging in value from $1,500,000 to $7,500,000. In each case the service proved of sufficient value through the saving of time to more than justify its cost to the district. In the largest project the total cost of the service was $18,000, and the time saved was at least two months at an estimated cost saving of $40,000 per month, which would have otherwise been spent to prepare for and hold double sessions and then move in.

Cautions:

Don't expect miracles. Contractors are not all familiar with the new scheduling technique and hence many are skeptical of its value. They must be led carefully to understand the technique and the time and money savings it can produce for them. C.P.M. can fail, especially if not handled properly by all parties to the project.

CHAPTER VII

Supervising and/or Inspecting Schoolhouse Construction

by FRANK F. ZELIP
Assistant Superintendent
Board of Education
Cicero, Illinois

Wherever feasible, districts planning construction of school additions or new facilities would indeed do exceptionally well to assign or hire a person to perform the services of an inspector to serve throughout the construction program and "seeing that everything comes out as good as possible for the owner."

Although this individual is sometimes called the "owner's superintendent" or "clerk of the works," his function is to inspect and not superintend or clerk. On a large project he would probably act as a chief inspector with several assistant inspectors serving under his direction. On small school additions he could be assigned on a part-time basis. He could be recruited from retired school business officials such as engineers, supervisors of buildings and grounds, business managers or assistant superintendents of schools. Former reputable contractors or building inspectors could very well fill the bill, too.[20]

Typical of the responsibilities of such an inspector are the following:

1. Review final plans and specifications thoroughly to discover omissions, errors, or non-practical requirements.

2. Negotiate changes to conform with the educational specifications or requirements on behalf of the owner.

3. Analyze and review the terms of the contract agreement.

4. Call inconsistencies or errors to the attention of the architect and/or engineers for interpretation and correction.

---

[20] Inland Steel Products Co., *Planning Tomorrow's Schools*, (Inland Steel Products Co., November 1966), p. 5.

5. Maintain a complete file on all phases of the construction job.

6. Report regularly to the business manager, assistant superintendent of schools, or chief executive officer (superintendent of schools).

7. Arrange for the contractor to prepare and maintain a construction schedule as per contract terms.

8. Facilitate shop and working drawings as needed by various trade and manufacturing groups.

9. Conduct actual physical inspections of all workmanship on a daily or periodic basis at the job site as work progresses.

10. Examine materials and equipment and arrange for proper testing to meet requirements and specifications.

11. Keep accurate records of excavating, concrete pouring, welding and penetrations.[21]

12. Above all, an inspector should be tactful, cautious, decisive, trustworthy, courteous, and avoid personal or friendly relationships with contractors, subcontractors, manufacturers' representatives and/or others.

---

[21] Engelhardt, Engelhardt and Leggett, *School Planning and Building* Handbook, (New York: F. W. Dodge Corp., 1956), pp. 511-512.

CHAPTER VIII

Movable Equipment

by PAUL M. GOODFELLOW
Business Manager
Los Alamos Schools
Los Alamos, New Mexico

Providing the right equipment to satisfy the needs of the educational program in a new facility is a major consideration. Aesthetics, durability, economy, efficiency and availability must be considered. The main objective, however, should be to provide proper balance among all criteria and still keep the equipment compatible with the program. The selection must involve teachers, principals, supervisors, superintendents and any other personnel who will be concerned in any way with the use of the equipment. It is also necessary that the person responsible for the procurement of such equipment be familiar with the educational objectives of the new facility. Utilizing this team approach, the chances of purchasing the right equipment with the greatest economy are greatly improved.

This chapter consists of four major subject areas: 1) Economy Versus Quality, 2) Standardization, 3) Specifications, and 4) Delivery Schedules as they pertain to the role of a school business official in school planning and construction.

Economy Versus Quality

The economy versus quality question is very controversial; however, to the school business official, quality usually means economy. Initial cost of quality products may be relatively high and therefore seem uneconomical; but if high quality means a durable, maintenance-free investment, then long run economy can offset the high initial cost. There may be budget restrictions that prevent the purchase of desired quality; thus, specifications will be written around low cost items.

Once the entire list of movable equipment has been agreed upon by those concerned, it then becomes necessary to establish proper specifications for procurement purposes. The primary objective in writing specifications would be to guarantee the acquisition of only that equipment which will adequately perform the service intended. Quality that is in excess of what is actually needed will increase cost needlessly.

Factors influencing economy and quality standards are:

a) Length of time product is to be in service.
b) Availability of funds.
c) Economy of operation.
d) Convenience to the user.
e) Durability.
f) Availability of vendor service.
g) Safety.
h) Delivery.

Unfortunately, insufficient funding of new facilities appears to happen entirely too frequently, primarily due to poor planning. Under these circumstances the equipment budget is the first to feel the pinch. The determination of equipment needs must take place in the early planning stages with accurate costs established if adequate equipment funds are to be made available.

Standardization

"Standardization generally describes the attempt to obtain the maximum amount of similarity among related items. This similarity is found in the basic characteristics. The term 'standardization' is frequently used to describe the attempt to reduce the number of related items to the smallest possible total, compatible with maximum efficiency."[22]

Lower cost should result from standardization, provided items purchased have a common stock description. The buying of less variety and in greater quantities usually will result in a savings, provided the specifications describe a product in a highly competitive market. Manufacturers producing such products will benefit from the same cost saving factors and, therefore, can pass the savings on to the consumer.

Lower inventory cost should result from a reduction in the number of accessory repair parts and supplies required for the types of units in use.

---

[22] H. Spilman Burns, *Purchasing and Supply Management Manual for School Business Officials*, (Chicago: ASBO, 1962), p. 81.

In reducing the number of related items to the smallest possible total, equipment maintenance and repair cost can be held to a minimum since those performing such services can be more familiar with the products where there is less variety.

The major disadvantage of standardized purchasing may be the unwillingness to change or keep abreast of new and better products. Equipment manufacturers are investing huge sums of money to produce those products that will best meet the educational objectives in the new facility. Attempts to standardize will require a superior knowledge of products available if wise selections are to be made.

Specifications

Specifications should be developed to insure the purchase of equipment that will be acceptable to the user without entailing extra costs for unnecessary performance or unneeded characteristics. Determining equipment specifications for an entirely new facility is a substantial undertaking. Considerable time must be set aside to develop adequate specifications. In some instances it may be necessary for vendors to bring in products for actual examination and tests. The writing of the specifications should be undertaken as a group project with teachers, supervisors, and purchasing personnel all cooperating for the best interests of the instructional program.

Since equipment is intended to last many years and represents a major investment, all concerned should be thoroughly satisfied with the specifications. Whenever possible, school officials should consult with other school systems as to whether they have had experience with equipment that may be new to their district. At many state, regional and national conventions there are equipment exhibits offering school personnel the opportunity to examine and compare many different brands.

There are two major types of specifications. The first is purchasing by brand name with no alternates permitted. This is a simple form of specifying equipment which will usually guarantee the product desired. It does have the disadvantage of eliminating competitive bids from other manufacturers. State laws may prohibit brand name bidding when limited to one manufacturer. The use of two or more brand names provides for greater competition; however, the buyer must be able to intelligently evaluate all brands bid. Brand name selections eliminate the need of a lengthy list of detailed specifications as the bidder can easily recognize the quality of the product desired.

Purchasing by formal specification is the second method used. It includes a general description and detailed listing of quality and construction characteristics. This type of bidding will generally permit more competition, resulting in lower cost; however, a more careful analysis of all bids is necessary than when buying by brand name. Some suppliers will use the term "or equivalent" which is a point the buyer must watch as the term could mean an inferior quality.

The final step in establishing specifications is that of examining delivered products for conformance with specifications. Unless this follow-up is made, specifications will loose much of their effectiveness as a purchasing aid.

Delivery Schedules

Finding adequate space to warehouse equipment purchased for new buildings is a difficult problem. A school district under normal conditions will need all existing warehouse facilities to meet regular receiving and storage needs; thus, it will not have space for storing large initial equipment purchases. Therefore, gymnasiums or other facilities must be used to provide temporary storage, making them unavailable for regular school functions. Many of these storage problems can be overcome by requiring suppliers to deliver according to a schedule coordinated with construction completion dates. Delivery schedules can be made a part of the specifications and should not add to the total equipment cost. It should be remembered that the supplier or freight company may experience unforeseen delays; therefore, it would be desirable to allow a two or three week leeway between date of delivery and building completion.

CHAPTER IX

Budgeting and Management of School Maintenance

by BURTON FROBERG
Assistant Superintendent
North Kingston School Department
North Kingston, Rhode Island

Introduction

Efficiency and economy are bedfellows in the design of school buildings. Management is frequently limited in effectiveness by the nature of the physical plant. Starting with efficient design, economy is the provision of suitable facilities at least cost. Recurring costs as well as initial costs must be considered. Economy in construction is often misrepresented, being frequently confused with cheapness or miserliness. Economy in construction is a total concept which includes long-range cost of operation and maintenance as well as initial cost. "Cheap" materials often require considerable maintenance and incur long-range expenditures which are considerably in excess of those which would have been incurred if properly selected, more costly materials, requiring little maintenance had been used. The net result on a long term basis would be that the more expensive material would be less than the cheaper one. In the planning of a new school facility, one must consider the cost of the future maintenance and operation of the plant. It is with this concept in mind that this chapter is presented.

Low Maintenance Cost Materials

A cheap building may deteriorate rapidly. Therefore, economy is a function of both maintenance cost and operational expenses. Floor and wall surfaces may be difficult to clean and maintain. Doors and windows may be difficult to operate. The heating and ventilating equipment may be underdesigned for a low initial cost.

Modern technological advances have produced many materials that have considerable merit in school building construction. The architect should apprise the owner of these many items and make an investigation as to their desirability for the particular facility under consideration.

One should remember that there is seldom, if ever, a clearcut "either/or" decision to make regarding the use of a particular building material.

Local conditions will often be a prime governing factor in the determination of certain materials and in making a selection of the various materials for a building. The owner and architect must consider all of the factors which determine the future cost of operating the building.

One may generalize by stating that terrazzo makes a more economical floor than asphalt tile, but to follow this generalization blindly could not result in a better educational situation in all areas. If the higher cost of terrazzo causes the elimination of, say, the reading areas or other essential areas in an elementary classroom, is the low-cost of terrazzo maintenance worth the price? A carpeted area may be better. Or, for example, would the installation of tack board on the corridor walls warrant the additional expenditure at the construction phase vs. extra wall cleaning costs of removing adhesives from the surface?

In selecting any material for our schools more than just the dollar cost should be considered. It should always be remembered that the school should serve rather than interfere with or dictate the educational program.

Insofar as possible, lighting fixtures, plumbing fixtures, valves, door closers, locks and many other items should be purchased from certain standardized manufacturers and used in the district's school buildings.

Custodial Supervision and Operation

Original and operating costs are major factors in school building economy. The needs of school personnel differ in many ways from those of occupants of residential or business structures. In buildings where proper design has not accounted for these needs, operating costs may prove excessive.

For example, a properly designed heating and ventilating system is essential. When school is in session and fully attended by pupils, there is usually a greater need for removing heat than there is for adding heat in the classrooms. The electrical system will have variable demands upon it, too.

For effective custodial and maintenance supervision and operation, adequate facilities, equipment and supplies should be provided in the district. These should consist of an office space, shop facilities for making school repairs, and sufficient numbers of storage spaces for supplies and equipment.

Contractors' and Manufacturers' Responsibilities for Instructing Personnel

The custodian is responsible for and charged with the daily physical operation of the school plant. Although it is the district's responsibility to provide trained custodians for the operation of the school, it is to the advantage of the architect and the various contractors to assure themselves that the custodian knows how to properly care for the various materials and equipment in a new school.

Custodians and maintenance personnel should have detailed and extensive instructions on the total plant. The architect should prepare a chart for the custodians showing the locations, operations, and service mechanisms of all the various areas and pieces of equipment. Demonstrations and detailed instruction should be given by the specialists or contractors in the various areas of plant operation. Operation of boilers, heating and ventilating controls, program clocks, and so forth, should be explained by either the factory representative or by representatives of the contractor. Drawings showing valve locations, lubricating parts, and the like should be fully explained to the custodians and kept on file for ready access.

In summary, it is recommended that the manufacturer's representative give adequate instruction to the custodial and maintenance staffs in the new building. It is the district's responsibility to have custodians available at the new building far enough in advance of completion in order to acquaint them with the many details necessary for efficient operation and maintenance of the new school plant.

Conclusions

The cost of operating and maintaining a school plant is considered a part of the total educational and building fund budget rather than part of capital outlay or construction costs. Nevertheless, decisions made during the planning and construction of a new school plant influence the cost of operation throughout the life of a school building. Considered on an annual basis this influence may not seem great, but accumulated over a 30 to 50 year life span of the building, the financial cost can be considerable.

Preventative maintenance is the best maintenance. Careful planning of the new structure will go a long way in saving public funds for operation and maintenance of the school plant.

APPENDIX A

EDSPECS - Foundation for Good Buildings*

by DR. WILLIAM O. WILSON and LOUIS E. SAAVEDRA

Dr. Wilson had originally sensed the need for a handbook of this type. He organized the format of this handbook and appointed the authors from the ASBO Research Committee in Schoolhouse Planning and Construction of which he was chairman. Dr. Wilson's untimely death in 1966 ended a brilliant career but did not stop the publication of his intended research bulletin.

It is fitting that we include Dr. Wilson's article on educational specifications as an appendix to the text of this research bulletin.

The purpose of a school building is adequately clear. Its only reason for existence is to create an environment in which learning can occur. To this end, educators have devised various formulas to try to assure that a proposed building will actually carry out the objectives for which it is designed. But despite all these formulas and checklists, new developments — in both the education program and in building techniques and materials — make constant re-evaluation of our goals necessary.

As education developed from the one-teacher, one-room school to the concept of separation by age and grade placement, different facilities were required. Greater numbers of students alone have been an important force in the development of a new kind of school facility, to say nothing of subjects our schools are expected to teach.

Technological and scientific developments soon added their influence to school buildings. Better ways to light a classroom were devised. As facts about lighting were discovered, school buildings began to depart from the traditional "school brown" surfaces to more reflective finishes. Control of artificial lighting was correspondingly improved. Better ways of heating a school building made possible greater flexibility in the arrangement of classrooms. No longer was it necessary to situate all desks around a stove in order to provide warmth. It was a much longer time before even ventilation was achieved — indeed, many older schools still depend on radiators which heat nearby areas extremely well, while students on the other side of the room are uncomfortably cold.

---

*Reprinted by permission of *American School and University*, May, 1966, pages 26-28.

The great revolution in school buildings, however, was one of ideas. When a teacher decided that children should participate actively in their own education and departed from the lock-step process typical of earlier classrooms, it signaled the end of the bolted-down desk. When educators proved that some things could be learned better in large groups and some things learned better in small groups, it led to the concept of flexible spaces and multi-purpose areas.

Illustrations in textbooks, used sparingly at first, were the embryonic forerunners of modern audio-visual tools aimed at giving the student a dramatic verbal — and visual — presentation of facts that will stick in his mind. These efforts to awaken the imagination of students and to stimulate their intellectual processes have developed into a great collection of teaching and learning aids. These new media have modified the traditional concept of the composition of a classroom and of a school plant, and will exert an even more profound influence in the immediate future.

Ideas, imprisoned by forms and shapes not created to accommodate these ideas, are indeed futile ideas. A creative teacher will implement his ideas regardless of the difficulties — but who can determine what great potential has been lost because of the shackles of a confined teaching-learning environment?

As the techniques of teaching are refined and improved, school facilities must also be refined and improved to meet these new requirements.

In the past, construction of a school building has too often been relegated almost entirely to the architect and the builder. It was perhaps only the builder who was concerned with the actual construction. The breadth and purpose of a school building was limited to the scope of the builder's or architect's vision.

In any other field, such a procedure would be unthinkable. Can you envision a manufacturer who would tell an architect to build him a new factory without first explaining the purposes of the factory, the activities which would take place in it, the machinery which would be housed in the plant, and the interrelationships of the persons who would work in it? In a field as complex as education, can administrators afford to abdicate their responsibility to spell out their educational requirements in precise terms for the architect they have hired?

Architects, even though they may be familiar with educational processes, cannot be expected to know details of enrollment, student background, subjects to be taught, how they are going to be taught, what teaching techniques will be used, what new technological media and instructional aids will be used, and what community use will be made of the school plant? This can only be determined by school officials.

The architect's job is to design school facilities after the administrator has told him what is to be included in the building, how it will be used, and what equipment and media will be employed. This is a task which is accomplished by compilation of educational specifications.

Educational specifications, in written form, should define clearly all the tasks which administrators hope to accomplish in the proposed school. The educational specifications begin with a general statement of the philosophy of education of the school district, and a more detailed statement of philosophy — or objectives — of the new building. This should include its goals, resources, planned activities, and an outline of the educational offerings, both present and future. What type of adult education program will be adopted and what other community use will be made of the facility? It is imperative that such a statement be formulated, as it will color the many decisions which must be made in the creation of a new school.

While the philosophy of the school is a starting point, the specifications will be valuable only if the educational program and its demands upon space are detailed in a concrete and meaningful fashion. The broader goals which educators envision must be translated into situations in which children can achieve these goals and ideals.

Production of the comprehensive document called for in the formulation of educational specifications cannot be a one-man job. Each school system should call upon staff members expert in a particular field to contribute to such a document. If the school plant is also to serve the community in other than its basic role, various citizen groups may also be involved to ascertain the best design for full utilization of the school plant in its different roles.

As the educational specifications are formulated, a systematic method of analyzing the document should be devised so that the document can anticipate all requirements of the architect. All functions of the school should be reflected. *The following partial checklist contains some of the major areas that should be included in drawing up educational specifications.*

A. *The Community To Be Served:*

1. An analysis of community growth.
2. An analysis of county growth.
3. Community cultural and recreational facilities available in the school service area.
4. An economic analysis of the community.
5. A sociological analysis of the community.
6. Maps showing the area to be served.
7. An analysis of mobility of the population.

B. *Site:*

1. Does the useable site area meet with normal recommendations for site size?
2. Have you checked the vehicular traffic pattern in the area?
3. Is parking space adequate for staff, pupils, and visitors?
4. Have you checked the drainage of the site?
5. Have you checked your plans with city and county planners and have you consulted with state highway planning directors?

C. *Nature Of The School Project:*

1. Enrollment expected the first year the school opens.
2. Enrollment expected the second year.
3. Optimum and maximum enrollment anticipated.
4. Will the school be built to its maximum size the first year?
5. If not, do you desire a master plan? Have you indicated what should be included in phase 1? Have you indicated what should be included in future phases?
6. Which grade levels will be served?
7. What is the time completion schedule required?

D. *Relationships Of Areas Of TheBuilding:*

1. Have you indicated relative location of administrative offices, library, academic classrooms, industrial education, performing and fine arts, health and physical education, assembly spaces, dining areas, and service areas?
2. What safety factors should be considered?
3. What aesthetic qualities are desired?
4. What cooling and heating conditions are required?
5. What sonic factors — both inside and outside — should be considered, and what acoustic treatment is needed?
6. What student circulation patterns are desirable?
7. What visual factors — quality and quantity of light and decoration — are desired?

The above listing suggests some of the many areas which may be considered. It should be used as a starting point and other, more specific, checklists should be compiled to cover the unique requirements of the school to be built. Individual checklists should be drawn up for the cafeteria indicating storage, cooking, and eating areas and clearly pointing out specific pieces of equipment that will be installed. Another checklist should be compiled for the auditorium indicating such obvious points as approximate size and seating capacity, seating arrangement, lighting, stage requirements, and a list of equipment to be used in the facility.

Similar checklists should be drawn up for the library, administrative offices, audio-visual facilities, custodial areas, and physical education and recreation areas. A detailed breakdown of the electrical system and other mechanical systems must also be included with any set of educational specifications.

The use of this type of suggested checklist is valuable if it enables school planners to anticipate a need before, rather than after, the walls go up. Paper can be torn apart far more swiftly than concrete; ideas can be lent wings as cheaply as they can be imprisoned if only educators would foresee their future needs.

From "STANDARDIZATION of Educational Specifications"*

by DR. WALTER L. NELMS
Assistant Professor, School of Education
Memphis State University
Memphis, Tennessee

This exerpt from Dr. Nelms' article and the following exerpt from Mr. Lyman's article contain suggested lists of the major areas to be included in drawing up educational specifications. Dr. Nelms is in the field of education, while Mr. Lyman is a partner in an architectural firm.

OUTLINE OF STANDARD FORM *of Educational Specifications*

I. GENERAL DATA SECTION

- A. Identification data
    - 1. Time placement of plant planning and construction
    - 2. Locale placement of the school-plant construction
    - 3. Personnel identification
    - 4. Type of construction
- B. Educational philosophy of the school and community
    - 1. Educational goals
    - 2. Anticipated methods and techniques of teaching
    - 3. Ways school plant may aid in reaching educational goals
- C. School organization
    - 1. Type of school
    - 2. General school and class size data
    - 3. Curriculum content
    - 4. Activity curriculum content
    - 5. Special services to be offered by the school

II. SITE SELECTION AND DEVELOPMENT

- A. Site Selection
    - 1. Site selection committee
    - 2. Checklist for site selection
    - 3. Geographical data of selected site
    - 4. Site size and shape
- B. Site Development
    - Site development checklist

III. SCHOOL ENVIRONMENTAL FACTORS

- A. General characteristics of environmental factors
- B. Spatial factor
- C. Thermal factor
- D. Lighting factor
- E. Sonic factor
- F. Aesthetic factor
- G. Safety factor
- H. Balance of environmental factors

---

*Reprinted with permission from *The American School Board Journal*, July, 1965. Copyright 1965, Bruce Publishing Co., Milwaukee. Copyright assigned 1967 to National School Boards Association.

IV. ADMINISTRATIVE SUITE

A. General characteristics of the suite
  1. Purposes
  2. Location
  3. General spaces to be provided
B. School executives' quarters
  1. Superintendent's office space
  2. Principal's office space
  3. Assistant principals', deans', or supervisors' offices
  4. General office space
  5. Guidance suite
  6. Health suite
  7. Administrative conference room(s)
  8. Teachers' lounge

V. AUDITORIUM

A. General characteristics
B. Location
C. Seating space
D. Stage requirements
E. Dressing rooms
F. Auxiliary rooms

VI. FOOD SERVICE SECTION

A. General characteristics
  1. Purposes of the food services center
  2. Location of the food services center
  3. General spaces to be provided
B. Food preparation center
  1. Food circulation flow chart
  2. Receiving dock
  3. Kitchen area
  4. Storage rooms
  5. Manager's office space
  6. Housekeeping equipment and supplies storage
C. Dining area(s)
  1. Organization of the dining area(s)
  2. Equipment for the dining area(s)
D. Environmental aspects of the food preparation center
  1. Structural design
  2. Plumbing requirements
  3. Lighting and electrical requirements
  4. Aesthetic requirements

VII. PHYSICAL EDUCATION SUITE

A. General characteristics
  1. Purposes and location of suite
  2. General spaces to be provided
B. Gymnasium floor space
  1. Construction data for gymnasium floors
  2. Playing-floor markings
  3. Gymnasium seating
C. Smaller activity rooms
   General characteristics and location of auxiliary rooms
D. Physical-education classrooms
E. Swimming-pool requirements
F. Dressing rooms
G. Shower-room requirements
H. Toilet-room requirements
I. Team-room requirements
J. Equipment-storage requirements
K. Laundry-room requirements
L. Equipment-storage requirements
M. Physical-education offices
N. Outdoor physical-education facilities

VIII. GROUP REST-ROOM FACILITIES

A. General characteristics
B. Group rest-room equipment

IX. LIBRARY

A. General characteristics
  1. Purposes and location
  2. General use of spaces to be provided
B. Specifications for specific library areas
  1. Student reading rooms
  2. Storage space for books and periodicals
  3. Librarian's office and workroom
  4. Studio and control room for ETV
  5. Individual study carrels
  6. Library conference rooms

X. SCHOOL CIRCULATION

A. Corridors
B. Stairways
C. Exits
D. Bus-loading platforms and traffic lanes
E. Other vehicle traffic lanes
F. School commons

XI. TEACHERS' OFFICES

A. General characteristics
B. Organization of the teachers' offices
C. Size of teachers' offices
D. Equipment and furniture of the teachers' offices

XII. CUSTODIAL SERVICES

A. General spaces required for custodial services
B. Location of the central custodial services in the plant
C. Description of custodial storage room(s)

D. Description of custodial internal storage spaces
E. Description of custodial external storage spaces
F. Head custodian's office
G. Custodial equipment to be stored

XIII. SCIENCE SUITE

A. General characteristics
B. Requirements of the general science room(s)
C. Requirements of the biology room(s)
D. Requirements of the chemistry room(s)
E. Requirements of the physics room(s)
F. Darkroom requirements
G. Requirements for special science areas
H. Science storage facilities

XIV. GENERAL CLASSROOM SECTION

A. General characteristics of the general classrooms
    1. Purposes and location of the general classrooms
    2. General classroom size requirements
B. Activities of the general classrooms
    1. Teaching techniques to be used
    2. Nonteaching activities
C. Equipment and furniture for the general classrooms

XV. SPECIAL CLASSROOMS SECTION

A. General characteristics of the special classrooms
    Subjects which require special classrooms and their general location within the building
B. Home-economics suite
C. Business-education suite
D. Music facilities
E. Art room(s)
F. Industrial-arts suite
G. Language laboratory

XVI. KINDERGARTEN SECTION

A. Kindergarten room size requirements
B. Location of the kindergarten room(s)
C. Kindergarten program
D. Auxiliary space for kindergarten classrooms

XVII. PRIMARY CLASSROOM SECTION

A. Primary organization
    1. Definition of primary classroom
    2. Primary classroom size requirements
    3. Location of primary classrooms
B. Primary program of activities
C. Auxiliary space for primary classrooms

XVIII. INTERMEDIATE CLASSROOM SECTION

A. Intermediate classroom organization
B. Intermediate program of activities

XIX. MULTIPURPOSE ROOM SECTION

A. General characteristics of multipurpose rooms
B. Activities of multipurpose rooms
C. Size requirements of multipurpose rooms
D. Location of multipurpose rooms

XX. CLASSROOMS FOR EXCEPTIONAL CHILDREN

A. General characteristics of the classrooms for exceptional children
B. Facilities for trainable children
C. Classrooms for educable children
D. Facilities for children with motor handicaps
E. Facilities for children with speech and hearing handicaps
F. Facilities for children with visual handicaps

APPENDIX A, Continued

from "Taking the Mystery Out of Educational Specifications Writing"*

by WILLIAM LYMAN
Partner, Jickling and Lyman (Architects)
Birmingham, Michigan

There are five major headings to be included in a list of educational specifications:

A. *Educational Philosophy and Community objectives*
B. *Anticipated Curriculum*
C. *General Architectural Characteristics*
D. *Detailed Description of Facilities*
E. *Proposed Budget*

A. Educational Philosophy and Community Objectives

1. What broad educational goals does your community seek for all its children? For its junior high or senior high students?

2. Are there any state, or national educational goals that should be kept in mind in planning this school?

3. In what way is your school program — elementary, junior high, senior high — affected by economic, social, cultural, historical or other characteristics of your community?

4. Are many changes taking place in your community that might influence its long range educational objectives?

5. Will this school have a particular educational philosophy or goals of its own?

6. To what extent should this school be designed as a community school?

7. What relationship will this school have to other educational or cultural facilities in the area?

B. Anticipated Curriculum

1. What attendance area will the school serve?

2. What grades will the school embrace?

3. Is any change in school organization anticipated in the foreseeable future?

4. What broad areas will be included in the instructional program?

5. Will any of the above areas receive special emphasis?

6. What social learnings will be emphasized in the program?

---

*Reprinted with permission from *The American School Board Journal*, September, 1962. Copyright 1962, Bruce Publishing Co., Milwaukee. Copyright assigned 1967 to National School Boards Association.

7. Are there any particular features of the educational program that should be noted?

8. Will any part of the program be "experimental" as opposed to "traditional"?

9. What is the complete list of offerings to be included in the program?

10. What type of staff organization will be employed to carry out the above program?

11. Will team teaching be employed in certain subject-matter areas?

12. Will the homeroom plan be employed?

13. Is the school-within-a-school concept to be given consideration?

14. What minimum and maximum size instructional groupings are anticipated?

15. In what subject-matter areas?

16. Are there any instructional methods, techniques, machines, or devices that should be noted?

17. To what extent should the school be designed as "student-centered" as opposed to "subject-centered"?

18. How much emphasis will be placed on the needs of individual students?

19. How will the school guidance program be organized?

20. What will be a typical day's program at each grade or ability level?

21. What extracurricular activities are to be included in the school program?

22. When will these extracurricular activities take place?

23. What is the anticipated scope of the program for continuing education?

C. General Architectural Characteristics

1. What is to be the life expectancy of the new school?

2. Are there any specific general architectural characteristics that are desired in the school?

3. Are there existing buildings in the community that might influence the architecture of the new school?

4. Does any particular plan type appear best suited to the educational program?

5. Are there any special requirements of pupil circulation that should be given particular attention?

6. In the design and arrangement of instructional spaces, how important are modifiability, versatility, flexibility, and expansibility?

7. In what spaces are these characteristics most important?

8. Has any broad statement been formulated regarding the importance of beauty in the new school — beauty as distinguished from extravagance?

9. Efficiency?

10. Economy?

11. Safety?

12. Physical comfort?
13. Windows?
14. Acoustics?
15. Heating and ventilating?
16. Air conditioning?
17. Artificial lighting?
18. Architectural finishes?
19. Color?
20. Storage facilities?
21. Toilet and locker facilities?

D. Detailed Description of Facilities

1. Describe in detail the instructional activities that will take place in each of the following areas?

English
Foreign Languages
Mathematics
Science
Social Studies
Art
Music
Library and Instruction Materials Center
Physical Education
Business Education
Industrial Arts
Homemaking
Other

2. What will the normal class loads be in each of the above areas?

3. How many teaching stations will be required to accommodate the above program and what is the estimated net floor area of each?

4. Are there any special considerations of size, shape, or other characteristics that should be noted in regard to particular instructional spaces?

5. Are there any desired plan relationships between particular instructional spaces that should be noted?

6. In what ways might any of the above activities (No. 1) be affected in the future by new organizational patterns or instructional methods?

7. What spaces will be needed for individual or small-group study?

8. What spaces will be needed for large group study?

9. What relationship should the above spaces (Nos. 7, 8) have to other instructional areas?

10. Are there any special considerations that should be noted in regard to spaces that will be used by the community as a whole?

11. What are the detailed storage requirements in each instructional and service space?

12. If an instructional materials center is to be provided, how is it to be used and what materials will it house?

13. If an extensive instructional materials center is not to be provided what audio-visual or other portable equipment or material will be required by the instructional program and where will it be used and stored?

14. If an auditorium is planned, what seating capacity should be provided?

15. What provisions should be made in regard to a stage?

16. What fixed equipment will be required in special areas: science, homemaking, music, art, industrial arts, physical education, etc?

17. What is the nature of the food service operation? Describe menus, total number to be served, number of shifts, kitchen staff organization, purchasing plan, provision for community use, etc.

18. What facilities are required in the administrative area?

19. What facilities are required for the guidance program?

20. How extensive an internal communications system is desired?

21. Are there any particular architectural or environmental considerations (lighting, heating, ventilation, acoustical) that should be noted in connection with particular instructional spaces?

22. What is the program for site development, both short-range and long-range? Include all physical education or other instructional facilities and distinguish between intramural and varsity programs.

23. What are the total short and long-range parking requirements? Note any desired distribution between various facilities — gymnasium versus classroom area, etc.

24. *Checklist of Miscellaneous Considerations.* Comment as necessary.

Bus Loading Facilities
Outdoor Paving and Furniture
Planting
Fencing
Storage Lockers
Coat Racks
Floor Materials
Floor Markings
Floor Mats
Folding Gates
Display Facilities
Wall Materials
Tacking Surfaces
Ceiling Materials
Acoustical Treatment
Color
Skylights
Classroom and Work Sinks
Drinking Fountains
Floor Drains

Shower Room Arrangement
Custodial and Mechanical Equipment Rooms
Cleaning System
Fire-Fighting Equipment
Hose Bibbs
Public Telephones
Intercom System
Program Bell System
Clock System
Fire Alarm System
Outdoor Lighting
Other

E. **Proposed Budget**

1. What total amount of money will be available for this project?
2. Approximately how will this amount be allocated to:
   - Site Acquisition
   - Building Construction (including fixed equipment)
   - Site Development
   - Architectural and Engineering Fees
   - Furnishing and Equipment
   - Contingencies
     - Total ....
3. What is the budget cost per student based on the total project cost?

APPENDIX B

School Plant, Construction, and Maintenance Records Manual

by FRANK F. ZELIP
Assistant Superintendent
Board of Education
Cicero, Illinois

For years we experienced a need for a reference manual or handbook on school facilities or buildings in the local school district. A factual record of various phases of building, operating, and maintenance is essential to board member, administrator, principal, and custodian alike.

Pertinent information collected and retained in a convenient place in the district's and principal's offices can be invaluable to school officials and employees as required.

Since most of our schools are designed to last 50 or more years, and, inasmuch as local taxpayers, including corporations and business firms, share in the initial and continued costs of school construction, operation, and maintenance, it behooves school officials to keep an accurate accounting of all related phases and current data.

It is hoped that the following proposed reference manual will serve a worthy purpose.

Charts for the following records are included:

- School Plant Data
- School Plant Site
- Miniature Facsimile of Plot Plan
- Miniature Facsimile of Floor Plans
- Interior Room Data
- Paint Record
- Roofing Record
- Heating Plant and Auxiliary Equipment
- Miscellaneous Maintenance Records

Board of Education, District #........

SCHOOL PLANT AND MAINTENANCE RECORDS MANUAL

City .... County .... State ....
Name of School: .... Address: ....
Telephone Number: ....
Date of Bldg. Construction: .... Total Construction Cost: $..
Bldg. Additions: .... Construction Cost: $..
(NO. OF ROOMS) (DATE)
.... Construction Cost: $..
(NO. OF ROOMS) (DATE)
School Architect: .... Address: ....
General Contractor: .... Address: ....
(ORIGINAL BUILDING)
.... Address: ....
(FIRST ADDITION)
.... Address: ....
(SECOND ADDITION)
Capacity of School: .... Enrollment: ....
Date: ....

TYPE OF CLASSROOMS	NO. OF ROOMS	ACTUAL SIZE	PUPIL CAPACITY
Regular Classroom	....	....	....
Kindergarten	....	....	....
Music Room	....	....	....
Art Room	....	....	....
Boys' Shop	....	....	....
Science Room	....	....	....
Home Economics	....	....	....
GENERAL USE ROOMS			
Library	....	....	....
Gymnasium	....	....	....
Auditorium	....	....	....
Multi-Purpose	....	....	....
Cafeteria	....	....	....
Nurse's Room	....	....	....
Boys' Lavoratory	....	....	....
Girls' Lavoratory	....	....	....
Teachers' Lavoratory	....	....	....
Principal's Lavoratory	....	....	....
Nurse's Lavatory	....	....	....
Public Lavatory	....	....	....
Locker-Shower Room	....	....	....
OTHER GENERAL FACILITIES			
Offices	....	....	....
Vault Room	....	....	....
School Kitchen	....	....	....
Faculty Lounge	....	....	....
Boiler Room	....	....	....
General Storeroom	....	....	....
Kitchen Storage	....	....	....
Custodial Storeroom	....	....	....
Furniture and Other	....	....	....

School Plant Site

Number of Acres .... **Approximate Sq. Ft.** ....

Date of Purchase .... **Cost of Land Site** ....

Deed Recorded .... **Title Policy** ....

Legal Description: ....

....

....

....

....

....

List of Easements or Restrictions: ....

....

Landscaping Data: ....

....

MINIATURE FACSIMILE OF PLOT PLAN

(Use additional pages as needed)

MINIATURE FACSIMILE OF FLOOR PLANS

(Use additional pages as needed)

INTERIOR ROOM DATA

(Specify . . . see listing shown below)

ROOM DESCRIPTION	ROOM NO.	FLOORING	ILLUMINATION	CEILING TYPE
Classrooms				
Kindergarten				
Language Center				
Music Room				
Band and Orchestra				
Art Room				
Auto Shop				
Boys' Shop				
Science Room				
Home Economics				
Library				
Mech. Drafting				
Sheet Metal				
Gymnasium				
Auditorium				
Multi-Purpose				
Cafeteria				
Nurse's Room				
Print Shop				
Lavatories:				
Boys'				
Girls'				
Teachers'				
Principal's				
Nurse's				
Public				
Locker-Showers				
Swimming Pool				
Offices				
Vault Room				
School Kitchen				
Faculty Lounges				
Boiler Room				
General Storerooms				
Kitchen Storage				
Custodial Storeroom				
Furniture and Other				
Corridors				
Stairways				
Platforms				
Stage				
Tunnel				

*TYPE OF FLOORING
- Concrete
- asphalt tile
- ceramic tile
- softwood
- hardwood
- cork tile
- grease-proof tile
- vinyl
- linoleum

**ILLUMINATION
- fluorescent
- incandescent
- infra-red
- recessed

- cork linoleum
- rubber tile
- marble
- terrazzo

***CEILING
- plaster
- acoustic-tile
- mineral tile
- acousti-metal
- acousti-plaster
- tectum
- dry wall
- exposed

PAINT RECORD AND SCHEDULE

School ....

YEAR PAINTED (Interior)		YEAR PAINTED (Exterior)	
DATE	$COST	DATE	$COST

Years to Repaint

DATE	AREA OR SECTION	ESTIMATED COST $

ROOFING RECORD

School .... Address ....
Type of Roof .... Approx. squares or footage ....
Date Installed .... Cost $...
Installed by ....
(NAME OF FIRM)
Address .... Foreman or Supt. ....
Warranty or Guarantee ....
(SPECIFY NO. OF YEARS)

REPAIR and MAINTENANCE OF ROOF

PURCHASE ORDER #	DATED	FIRM	SECTION OR AREA	APPROX. COST

HEATING PLANT AND AUXILIARY EQUIPMENT

School .... Address ....
Electrical Voltage in Bldg. .... Phase ....
(SPECIFY 110, 208, OR 240v)

SIZE OF MAINS leading to the building:
Water pipes ....
Gas pipes ....

LOCATION OF METERS:
Water ....
Gas ....
Electric ....

BOILER DATA:
Name of Mfgr. ....
Size or Capacity ....
Style .... Serial No. ....
Date Installed .... Guarantee Date .... MFG. BY
Low Water cut-off ....
Pressure-trol ....
Safety Pop-off ....
Aquastat ....
Flame Eye Control ....
Automatic Water Feeder ....
Safety Pilot ....

BURNER DATA: (Oil or Gas)
Name of Mfgr. ....
Size ....
Type ....
Serial No. ....
Motor No. ....
Fire Safety Switch ....
Date Installed ....

OIL TANK:
Size (gallons) .... Make ....
Date Installed .... Location ....

HOT WATER HEATERS:
Size (gallons) .... Make ....
Date Installed .... Location ....
Gas or Electric? ....

COMPRESSOR (VACUUM) PUMP:
Name of Mfgr. ....
Size or Capacity ....
Serial No. .... Motor No. ....
Date Installed ....
Location ....

SUMP PUMP:
Name of Mfgr. ....
Size .... Serial No. ....
Date Installed .... Location ....

AUXILIARY EQUIPMENT

CLOCK & BELL SYSTEM:

Name of Mfgr. ....

Description ....

Date Installed ....

Location of Main Panel ....

....

Person to contact in case of trouble: ....

....

ATT.: (NAME OF FIRM)

....

(TELEPHONE NO.)

FIRE ALARM SYSTEM:

Mfgr. ....

Description of Unit ....

....

Date Installed ....

Alarm connections to Fire Dept.? ....

TYPE OF FIRE PROTECTION DEVICES:

Heat Detector? ....

Smoke Detector? ....

Sprinkler System? ....

MISCELLANEOUS MAINTENANCE AND REPAIR RECORDS

DESCRIPTION	AREA OR SECTION OF BLDG.	REPLACEMENT OR NATURE OF REPAIR	DATE	COST
Blacktopping	....	....	....	$............
Caulking	....	....	....	$............
Cement Paving	....	....	....	$............
Electrical Wiring	....	....	....	$............
Fencing	....	....	....	$............
Landscaping	....	....	....	$............
Plumbing Fixtures	....	....	....	$............
Sheet Metal Work	....	....	....	$............
Sewer Rodding & Cleaning	....	....	....	$............
Tuckpointing & Masonry	....	....	....	$............
Window Sash	....	....	....	$............
Window Shades	....	....	....	$............

(Use additional pages as needed)

APPENDIX C

SCSD - A Significant Concept

by the SCHOOL PLANNING LABORATORY
of The School of Education
Stanford University
Stanford, California

The School Construction Systems Development project was conceived to find answers to crucial problems in the construction of school buildings. The stated objective of the project is to provide architects and school districts with an *integrated system of construction components* which will:

(1) offer architects desired design flexibility in meeting the changing program needs of individual schools,

(2) reduce the cost of school construction and give better value for the school building dollar in terms of function, environment, first cost and maintenance, and

(3) reduce the time needed to build a school.

The project has now progressed through its beginning stages and is rapidly approaching the target date for construction of a mock-up building of about 4,000 square feet to test the component system which will be used to build twenty-two schools by the end of 1967.

SCSD is a joint project of the School Planning Laboratory and the Department of Architecture of the University of California at Berkeley under a grant to Stanford University from Educational Facilities Laboratories, Inc., a non-profit corporation established by the Ford Foundation.

The project began on the premise that the pattern of building one school at a time does not provide sufficient opportunity or incentive for architects and manufacturers to explore approaches to building schools which depart significantly from traditional methods. Logically, a large contract for buildings was needed. To accomplish this, SCSD convinced thirteen school districts to pool their projected building needs and to offer the twenty-two buildings involved as an assured market for products to be developed by manufacturers.

The next step was an equally unusual one. SCSD architects and educators wrote a set of *performance specifications* for the building components required. These specifications were based on a comprehensive survey of building needs common to the school districts involved, with an emphasis on flexibility, which permits changes in the school program. Final specifications required development of a total system of four compatible components:

1. Structure
2. Lighting-ceiling
3. Heating, ventilating, and cooling
4. Interior partitions
    - fixed walls
    - demountable walls
    - panel-type operable walls
    - accordion-type operable walls

The objective in requiring a *total system* of components was to eliminate any needless duplication of function while providing a high degree of flexibility. Over one hundred manufacturers expressed initial interest in the development of products, twenty-six finally submitted bids. Five of these twenty-six have been selected to provide products for the buildings to be constructed. The specifications as the results of the bidding show, are quite realistic and economically feasible even though they surpass any other known building system for total flexibility and function. In fact, in addition to satisfing all the SCSD specifications, the components of the five successful bidders will cost less than their conventional counterparts (figured on the basis of average building costs in California).

A basic premise of SCSD, from the very first, has been to avoid stock-plan, or mass-produced schools. In order to avoid these pitfalls, the system does not include the exterior walls of a school building. Also, the SCSD components are considered architecturally neutral – neither dictating nor inhibiting design. Since the architect can put them together with the ease of an oversized "erector set" and still be certain that they are architecturally sound, he is free to concentrate on basic planning tasks such as space requirements and relationships.

THE COMPONENTS

Inland Steel Company was the successful bidder for both structural and lighting-ceiling system. Their products feature a maximum utilization of materials, resulting in minimum weight, while completely satisfying SCSD specifications. Inland's structural system is designed for easy shipment –

no small item when long spans of roof trusses are involved — and easy erection on the job. The "loft-type" structural system serves as roof or floor, support for the lighting-ceiling system and housing for the heating, cooling, and ventilating ducts and utility lines. The system is built on a five-foot structural module and provides spans from 30 to 110 feet. (Fifty per cent of the building spans will be 55 to 70 ft.)

The lighting-ceiling system provides low-brightness lighting designed to maintain seventy footcandles and will be available in at least nine variations to meet specific needs, it includes considerations for controlling heat from lighting and can be given sound-absorbing qualities. The air-conditioning system by Lennox Industries of Marshalltown, Iowa, consists of roof-top units, each designed to provide air conditioning for a basic module of 3,600 square feet of floor space. The system is highly flexible, however, and it is possible to control independently the air conditioning for *any 450* square feet of a basic module. Thus, a high degree of ventilating flexibility is assured to serve rooms of different sizes. The lighting-ceiling system provides outlets for the air-conditioning through a system of snap-in ducts and flexible hoses.

The SCSD specifications for fixed walls were satisfied along with those for demountable walls in a single bid by the E. F. Hauserman Company of Cleveland, Ohio. The result is that *all* walls in the schools to be built will be either demountable or operable types — thus providing *total* flexibility for all interior partitions. The Hauserman wall consists of a steel frame system and wall panels made of gypsum board sandwiched between pre-primed sheetmetal. With this system, an entire wall, including doorways, can be moved with a minimum of effort.

The panel-type operable wall contract was awarded to Western Sky Industries of Hayward, California. Their wall comes complete with its own frame to enable the easy relocation of the entire unit. The design contains a simple relocation of the entire unit. The design contains a simple mechanical expansion device to seal the door acoustically at the top and bottom. Each panel wall also includes a swing-type three-foot-wide pass door equipped with a conventional latch set.

The accordion operable wall is manufactured by the Hough Manufacturing Company of Janesville, Wisconsin. It is one of their standard products which has been improved to meet SCSD requirements. Like the panel-type wall, it comes complete with its own frame system to make easy relocation feasible.

NEXT STEP

The SCSD timetable calls for construction to begin on a prototype building in May of this year. The building, to be located at Stanford University, will bring all the SCSD components together and provide a place for final field testing of ideas by manufacturers and architects. By June, 1965, the testing stages will be completed and the manufacturers will begin to supply components to school sites. The construction of the twenty-two schools will proceed until the end of 1967.

The architects and educators on the SCSD project are confident that a major breakthrough in school construction has been realized.

Additional benefits from the project will likely include new marketable products for the building industry from the research and development done by all the companies who submitted bids. For the SCSD member school districts, the component concept will provide high-quality building performance and flexibility at a cost below that for conventional construction.

APPENDIX D

How Do YOU Pay YOUR Attorney For Service Related To Bond Proceedings?*

by DR. FREDERICK J. BYRNES
Assistant Superintendent
Ridgewood Public Schools
Ridgewood, New Jersey

School administrators are always on the alert to make effective economies and are especially interested in savings that do not impair the instructional program. This is true for both operating and capital budgets. One real economy that continues to be over-looked by many school districts is in the method of paying the fee of the local attorney for services related to the district's bond proceedings. In 1955 the writer made a study of these fees for districts in the New York City metropolitan area as his doctoral project and found that in the post-war school construction boom many local attorneys were determining their fees on a percentage of the total bond issue. In rapidly growing districts which were almost constantly building, these fees soon became substantial and in a few districts the taxpayers revolted to the point of carrying their case to the state education department. The percenage-based legal fee, however, is still being used in too many districts in this area.

Several points should be made at the outset that might clarify what it is we are considering in our discussion of services of local attorneys related to school bond proceedings. FIRST, the statutory requirements for bond proceedings must be met and the board of education should, in its early planning stages, secure the services of a competent attorney to advise and supervise the legal details. SECOND, it should be understood that there are two types of attorneys that may be retained — (1) special bond counsel and (2) the local attorney who practices law in the community and who is ordinarily not a specialist in bond law. The district has to have special bond counsel if it hopes to sell its bonds. This counsel prepares the notices, resolutions, advertisements and other documents to assure the legality of each step in the program. The bond counsel assures prospective investors before the sale of the bonds that he will furnish his approving opinion to the successful bidder that the bonds are valid and legally binding obligations of the district. The local attorney renders service on the local level and acts as liaison between the board and the attorneys. Practically all of the sixty-six districts included in the study did retain the services of a local attorney for such services.

*Reprinted by permission of *School Business Affairs*, July, 1961.

THIRD, it is necessary to define what is meant by "services rendered related to school bond proceedings." These services for the most part are routine and for the purposes of this study included the liaison work with the bond counsel, attendance at meetings, preparation of land descriptions to be included in the proposal if land were being acquired, review of contracts, consultations with architect and contractors, as well as other routine services that would have to be done by the school business official of the local attorney such as posting notices, preparing extracts of the minutes, and placing the advertisements for publications. These services are rather routine in nature but important if the district is to avoid any question as to the validity of its proceeding. However, it should be emphasized that the special bond counsel is the attorney who offers his specialized skill and knowledge to the district throughout the proceedings. A New York State Education Department publication made the following statement in this regard:[1] If the selection of the bonding attorneys is made early and with proper care, the local attorney under ordinary circumstances will have little work with the bond issue.

Many districts employ an attorney on an annual retainer and in some cases the retainer includes all services including those related to a bond proceedings. If an attorney is not on a retainer basis, it would be advisable to retain such services and, as a matter of fact, in New Jersey the special bond counsel would insist on this being done before agreeing to represent the district. The bar associations have objected to the former practice followed by some districts where local attorneys were not retained on the basis that local school officials were attempting to engage in the practice of law. The question then becomes just how a board should determine the amount of the fee for services rendered. What are the ways in which a fee can be determind? From the Canons of Professional Ethics of the American Bar Association, we learn that in determining the amount of the fee, it is proper to consider:

> "1. the time and labor required, the novelty and difficulty of the questions involved and the skill requisite properly to conduct the case,
> 2. whether the acceptance of employment in the particular case will preclude the lawyer's appearance for others in cases likely to arise out of the transaction, and in which there is a reasonable expectation that otherwise he would be employed, or will involve the loss of other employment while employed in the particular case of antagonisms with other clients;
> 3. the customary charges of the Bar for similar services;
> 4. the amount involved in the controversy and the benefits resulting to the client from the services;

---

[1] New York State Education Department, "A Guide to Administrative Procedures." School Building Project, No. 17, 1950, p. 13.

> 5. the contingency of the certainty of the compensation; and
> 6. the character of the employment, whether casual or for an established and constant client. No one of these considerations in itself is controlling. They are mere guides in ascertaining the real value of the service.
>
> In determining the customary charges of the Bar for similar services it is proper for a lawyer to consider a schedule of minimum fees adopted by a bar association, but no lawyer should permit himself to be controlled thereby or to follow it as his sole guide in determining the amount of his fee.
>
> In fixing fees, it should never be forgotten that the profession is a branch of the administration of justice and not a mere money-getting trade."

It is not suggested that attorneys serving school districts at the local level are unethical for undoubtedly most are changing fees which are reasonable for services rendered. However, too many in this area rely only on "the customary charges of the Bar for similar services" and thus justify a percentage-based fee.

The 1955 study revealed that there were many variations in practice — 1) straight percentage, 2) sliding percentage, 3) flat fee, 4) percentage of bond counsel's fee and time basis. In some cases the fee was for *all* services including land acquisition, condemnations, litigation, etc., as well as extra costs such as the fee of the bond counsel, advertising costs and expense of signature company. In the New York metropolitan area, there had developed in the post-war period a trend toward the percentage-based fee and the one per cent fee was rather common. Are there any advantages of the percentage-based fee to the school district? One attorney wrote to this point, "The only reason which I see for a percentage fee is in order to be sure that the fee will not cause the costs of construction to exceed the amount of the authorization." This same attorney went on to say, "However, I agree that in some cases, the attorney would be overpaid if the fee were computed on a percentage basis." A percentage-based fee, if all legal costs are included, does make it possible to prepare your budget with some exactness, but with all of the unknowns to be met in the usual building program it would be hoped that the amount budgeted for contingencies would also provide for unusual legal expenses. Our district had a bond referendum last October in the amount of $2,575,000 and the architect had budgeted in his preliminary figures the amount of $30,000 for bond counsel and local legal fees. This was reduced to $5,000 and to date we have paid local fees in the amount of $2,007 most of which is for services and title insurance related to the acquisition of four residential properties by the district. Ridgewood does NOT have an attorney on a retainer basis, but pays on a TIME BASIS for all legal services rendered. The annual budget for legal fees is $500 but our costs have averaged much less than this over the past ten years.

What is the disadvantage of the percentage-based fee to the district and to the taxpayers? The big disadvantage is that there is no relationship between the size of the bond issue and the value of the services rendered — can a case be made that a local attorney actually renders twice as much service on a $3,000,000 bond issue as on a $1,500,000 bond issue when the entire procedure is exactly the same? If one issue has more complications than another, then a fee based on an HOURLY RATE will take care of the time differential. Yet many local attorneys continue to tell boards of education in this area that a one per cent fee is the "customary" fee for such services. The special bond counsel bases his fee on a sliding scale that seems reasonable and fair. For the 200 bond issues included in the 1955 study these fees AVERAGED ONE-TENTH OF ONE PER CENT of the total bond issues. Our district has paid the following fees to special bond counsel on its last three issues:

$1,707,500	$1,943.14
1,975,000	1,722.41
1,936,000	1,987.24

Why is it that boards of education are still willing to pay percentage-based fees to local attorneys that result in substantial fees which in many cases represent more than the superintendent's annual salary? The reasons can be summarized as follows:

1. This is the customary fee, other boards are paying it, the State Education Department said this was the usual fee.

2. The board and superintendent feel that the bond proceeding is a legal matter and great care must be taken to see that nothing goes wrong. The fee or the basis for it is not questioned. Many boards reported they did not know on what basis the local attorney was going to determine his fee.

3. A feeling that this is a chance to pay the local attorney for services rendered over the years on a rather small retainer. This will "average out" the fees for his services. This is not usually a publicized expense and the public need not know what arrangements are made.

4. Boards have felt that the local attorney had a following in the community and it would be helpful to have his support.

5. Boards have felt the need for the political influence of the local attorney where special problems existed such as those related to acquisition of property or the need for special legislation.

6. This is a tremendous responsibility for the local attorney and he will have to assume the blame if anything goes wrong and may even be sued for malpractice.

7. A time based fee such as $25 per hour may actually sound like more money to some boards than a fee of one percent or one-half of one per cent of the total bond issue.

One of the conclusions of the 1955 study was that the fees of local attorney for services related to school bond proceedings should be reasonable and adequate and should be determined on the basis of time. From all reports, there has been a steady trend away from the one per cent fee although the percentage-based fee is still used in the New York metropolitan area to a degree. Many of the districts included in the study have changed to a time based fee, some have placed their attorney on an annual retainer which includes all services and others have substantially reduced the fee either on a flat fee basis or on a reduced or sliding percentage basis.

State departments of education are reluctant to take too strong a stand in regard to these fees. One reason for this is obviously the fact that many of the legislators in all states are lawyers who in private practice represent school districts and other governmental units in the state. However, the Pennsylvania Department of Public Instruction in 1960 did establish a schedule of maximum fees which would be approved for inclusion in the amount of money to be financed for a school building project. This schedule is as follows: 1% of first $100,000; ½% of next $200,000; ¼% above $300,000 to a maximum of $3,750.00. The Department made it clear that this schedule was not intended to fix the amount of such fees and the school district could pay more if it so desired, but such amount could *not* be included in the amount to be financed as a part of the project. More state departments should take action similar to this.

There are savings that can be made in this area without any effect on the instructional program except to have more funds available for other purposes such as furniture and equipment. School practices in this regard — employ a local attorney of competence and integrity and pay him a reasonable fee for these services based on time.

BIBLIOGRAPHY

Most of the following books and pamphlets are available on loan to ASBO members from the Research Library. Many articles – much too numerous to list below – are also available.

American Association of School Administrators. Planning America's School Buildings. Washington, D. C.: the Association, 1960.

Architectural Record. Schools For the New Needs. New York: F. W. Dodge Corporation, 1956.

Boles, Harold W. Step By Step to Better School Facilities. New York: Holt, Rinehart and Winston, 1965.

Building Research Institute. School Building Research. (Publication No. 1008). Washington, D. C.: the Institute (1725 De Sales St., N.W.), 1963.

Caudill, William W. Toward Better School Design. New York: F. W. Dodge Corp., 1954.

Chase, William W. Problems in Planning Urban School Facilities. (O.E. Bulletin 23) Washington, D.C.: Government Printing Office, 1964.

De Bernardis, Amo, et al. Planning Schools For New Media. Oregon: Portland State College, 1961.

Educational Facilities Laboratories . Cost of a Schoolhouse. New York: the Laboratories (477 Madison Ave.), 1960.

Engelhardt, N. L.; Engelhardt, N. L., Jr.; and Leggett, Stanton. School Planning and Building Handbook. New York: F. W. Dodge Corp., 1956.

Garber, Lee O., and Edwards, Newton. Law Governing School Property and School-Building Construction. School Law Casebook Series, No. 7. Danville, Ill.: Interstate Printers and Publishers, 1964.

Handler, Benjamin. Economic Planning for Better Schools. Ann Arbor: College of Architecture and Design, University of Michigan, 1960.

Herrick, John H., et al. From School Program to School Plant. New York: Henry Holt and Co., 1956.

Interstate School Building Service. Economics in School Construction. Nashville, Tenn.: the Service, George Peabody College for Teachers, 1962.

Knight, George A. Guidelines for a City School Building Program. Houston, Texas: Gulf School Research Development Association, 3801 Cullen Blvd., 1966.

McClurkin, W. D. School Building Planning. New York: Macmillan Co., 1964.

McFarland, Robert Wesley. Criteria for the Development of Educational Specifications for School Building. Ed.D. dissertation. Washington State University, 1967. Copies available from University Microfilms, Inc., order No. 67-15, 756.

Murphy, Judith. Middle Schools. New York: Educational Facilities Laboratories, 1965.

National Council for School House Construction. Guide for Planning School Plants. East Lansing, Mich.: The Council, 1964.

Nimnicht, Glendon P., and Partridge, Arthur R. Designs for Small High Schools. Greeley, Colorado: Educational Planning Service, Colorado State College, 1962.

Ontario Department of Education. Guidelines for Planning Colleges of Applied Arts and Technology. Ontario: ODE, Div. of School Planning and Building Research, 1968.

Papke, Ross Roy. School Plant Research by Educators and Architects. Ed.D. dissertation, University of Wisconsin (Madison), 1955.

Pierce, David. Saving Dollars in Building Schools. New York: Reinhold Publishing Corp., 1959.

Roaden, Ova Paul. The Essential Elements of Educational Specifications for School Plant Facilities. Ed.D. dissertation, University of Tennessee, 1963. Copies available from University Microfilms, Inc., order no. 63-5924.

Roe, William H. School Business Management. New York: McGraw-Hill Book Co., 1961. Chapter 10, "Building the New School Building."

School Planning Laboratory. SCSD – A Significant Concept. Stanford, California: School Planning Laboratory, School of Education, Stanford University, 1964.

Sessions, E. B. Rehabilitation of Existing School Buildings or Construction of New Buildings? Chicago: Research Corporation of ASBO, 1964.

Stautz, Carl H. Planning Your School Building Dollar. Philadelphia: Chilton Co. Book Division (56th and Chestnut Streets), 1960.

Strevell, Wallace H., and Burke, Arvid J. Administration of the School Building Program. New York: McGraw-Hill Book Co., 1959.

Sumption, Merle R., and Landes, Jack L. Planning Functional School Buildings. New York: Harper and Brothers, 1957.

Taylor, James L.; Gore, Lillian L.; and Gabbard, Hazel F. Functional Schools for Young Children. (Special Bulletin No. 8) Washington, D.C.: Office of Education, Government Printing Office, 1961.

INDEX

Andrews, Lester E., 14
Attorneys
  determining the fee for services relating to bond proceedings, 76-80
  bond counsel, 8-10
  (see also Bonds)
Architects
  and edspecs, 60-61, Appendix A
  relations with, 20-23
  selection of, 20-21

Bibliography, 81
Bids
  laws governing, 22-23
  types of construction bids, 22
Bonds
  the attorney, 9-10
  the bid, 11
  determining the fee for attorney services, 76-80
  planning the issue, 7
  rating, 7-8
  types of, 8-9
Bunnell, Clyde, 7
Byrnes, Dr. Frederick J., 76-80

Construction Systems Development, 72-75
Contracts, legality of, 27-28
Critical Path Method, 34-41
  arrow diagram, 35-36
  C.P.M. consultant, 37-39
  cost of, 39
Curriculum
  in edspecs, 59-60

Daum, Dr. Henry F., 34

Educational Specifications, 51-63 and Appendix A
  standardization of, 56-58
Environment, 29-33
  sonic, 29
  thermal, 32
  visual, 30

Equipment, 44-47
  delivery schedules, 47
  specifications, 46-47
  standardization of, 45-46

Financing
  bonds, see Bonds
  other methods, 12-13
  planning, 7-13
Froberg, Burton, 48

George, Dr. N. L., 29
Goodfellow, Paul M., 44
Guarantees, 24-28
  definition, 25-26
  surety bonds, 24

Inspection of construction, 42

Lighting, 30-31
Long, Lloyd V., 20
Lyman, William, 59

Maintenance
  budgeting of, 48-50
  instruction of personnel, 50
  records manual, 64-71
Movable Equipment, 44-47

Nelms, Dr. Walter, L., 56

Objectives, educational (see edspecs)

Planning
  C.P.M., 34-41
  fiscal, 7-13
  SCSD, 72-75
Property, see Site

Records Manual, 64-71

SCSD, 72-75

Site, 14-19
  acquisition, 17
  selection, 14
Sonic environment, 29
Specifications, 21, Appendix A
  of equipment, 46
  standardization of, 56-58
  "Taking the mystery out of . . .", 59-63
Standardization of equipment, 22, 45-46
Supervising construction, 42-43

Thermal environment, 32

Uniform Sales Act, 27

Visual Environment, 30-31

Warranty, see Guarantees
Wilson, Dr. William O., 51

Zelip, Frank F., 4, 5, 24, 42, 64

BUILD UP YOUR PROFESSIONAL LIBRARY!

The following ASBO publications are recommended for your reading:

ANNUAL VOLUME(S) OF ASBO PROCEEDINGS, ADDRESSES, AND RESEARCH PAPERS. Hard-cover books, about 500 pages each, one each year, 1958 thru 1967 @ $5.00 each. Prior years, paper covers: 1956 and 1957, $4.00 each; 1955, $3.00 each.

NO.	YEAR PUB.	RESEARCH BULLETINS	PRICE EACH
8	1968	GUIDELINES FOR SCHOOL PLANNING AND CONSTRUCTION, Zelip	$1.00
7	1968	SCHOOL FOOD PURCHASING GUIDE, Flanagan	1.00
6	1967	WHAT IS OPERATIONS?, Schaefer	1.00
5	1966	WAGE AND SALARY ADMINISTRATION HANDBOOK, McGrigor	1.00
4	1966	GUIDING PRINCIPLES AND PRACTICES IN OFFICE MANAGEMENT: A Handbook for School Business Officials, Bragin	1.00
–	1965	EDUCATION IS GOOD BUSINESS (AASA, NSBA, ASBO)	2.00
3	1965	THE SCHOOL FOOD SERVICE DIRECTOR (ASFSA, ASBO)	1.00
2	1964	REHABILITATION OF EXISTING SCHOOL BUILDINGS OR CONSTRUCTION OF NEW BUILDINGS, Sessions	0.50
1	1964	THE ADMINISTRATION OF NON-INSTRUCTIONAL PERSONNEL IN PUBLIC SCHOOLS, Cohen & Bogg	1.00
–	1963	CONTROL POINTS IN SCHOOL BUSINESS MANAGEMENT, Joyner	1.00
23	1962	THE SELECTION, ADMINISTRATION, AND CONTENT OF HEALTH INSURANCE PLANS FOR PUBLIC SCHOOL DISTRICTS PERSONNEL, Campen	1.00
22	1962	PURCHASING AND SUPPLY MANAGEMENT MANUAL FOR SCHOOL BUSINESS OFFICIALS, Burns	2.00
21	1960	THE SCHOOL BUSINESS ADMINISTRATOR, Hill (AASA-ASBO joint publication, endorsed by NSBA)	1.00
20	1960	ASBO, THE FIRST 50 YEARS: The Building of the School Business Management Profession, Grill and Brown	0.50
19	1959	FRINGE BENEFITS FOR CLASSIFIED EMPLOYEES IN CITIES OF 100,000 POPULATION OR GREATER, Egly	0.50
18	1958	FIRE INSURANCE PRINCIPLES AND PRACTICES, Salmon	0.50
17	1957	A MANUAL OF ACCOUNTING PRINCIPLES AND PROCEDURES FOR STUDENT ACTIVITY FUNDS, Davis	1.00

Make checks payable to:
ASSOCIATION OF SCHOOL BUSINESS OFFICIALS

Mail them to ASBO at:
2424 West Lawrence Avenue
Chicago, Illinois 60625

POLICY: ASBO pays "regular" postage one way. Air mail, special delivery, and anything other than "regular" postage is billed to the customer. If books are returned to ASBO, customer pays postage on returned books.

ASBO recommends you consider:

A PUBLICATIONS SUBSCRIPTION

for School Board Members and our Business Associates, including:

- ► Elected School Board Members
- ► Elected School Trustees, and Directors
- ► ASBO Exhibitors and Advertisers (inclusive fee)
- ► Interested Company Representatives
- ► Educational Consultants
- ► Certified Public Accountants
- ► Management Consultants
- ► Architects, Contractors, and Engineers
- ► Others interested in the field

A Publications Subscription is for the ASBO fiscal year, which is the calendar year. It includes:

1) SCHOOL BUSINESS AFFAIRS – an annual subscription to this newsletter-journal, which is the official organ of ASBO;

2) ANNUAL VOLUME OF PROCEEDINGS – describing the important Annual Meeting;

3) BLUE BOOK – which is an Annual Directory of ASBO as of December 31 of the previous year;

4) A copy of each ASBO BULLETIN published during the year.

Read the above publications and "keep up" with the fast-growing field of school business administration!

—OFFICIAL ANNOUNCEMENT—

ALL QUALIFIED PERSONNEL are invited to join the ASSOCIATION OF SCHOOL BUSINESS OFFICIALS of the United States and Canada – either as a member or subscriber – and attend the ASBO

ANNUAL MEETING and EDUCATIONAL EXHIBIT EACH OCTOBER

Both the beginning and the experienced school business official – at either the administrative or supervisory level – will benefit from ASBO's Annual Meeting and Educational Exhibit each October.

ASBO Meetings are not open to the public. They are "closed" meetings – for members and subscribers only. You must belong to ASBO in order to gain admittance to the Annual Meeting and Educational Exhibit.

Attendance at this coming October Meeting by a "team" of your school's – or school district's – school business managerial personnel is especially recommended to ensure full application of the Meeting's benefits to your own school operations.

You will listen to inspirational speakers at the General Sessions. You will see the latest and finest in school supplies and equipment at the Educational Exhibit. You will have the privilege of participating in discussion groups – in a specialized area of school business of your choice. These discussion groups will be held in:

Negotiations
Schoolhouse Planning and Construction
Insurance Management
General Obligation School Bonds
Purchasing and Supply Management
Management Development Techniques
Junior College Management
Transportation Management
Professionalization
Legal Aspects of Schl. Bus. Admn.
State Depts. of Education
Maintenance and Operations
Accounting adn Finance
Data Processing
Private School Management
Personnel Management
School Food Service Mgmt.
Office Management
University Contacts
Product Information

At the Clinic you will have an opportunity to present your own, individual school business problems to experts and authorities in specialized fields, for possible and potential solutions. You'll love it! Fill in an Application for Membership today, and mail it to:

ASSOCIATION OF SCHOOL BUSINESS OFFICIALS
2424 West Lawrence Avenue, Chicago, Illinois 60625
U. S. A.

ASBO MEMBERSHIP CATEGORIES

SCHOOL MEMBER. $20.00 per year. The governing board, board of education, etc., may subscribe for a membership for any school under its jurisdiction, with the understanding that a representative – who is eligible for membership in ASBO – shall be designated to exercise the rights and privileges of a School Member. It is further noted that the $20.00 dues is for only one (1) membership, which includes ASBO publications and annual meeting privileges to one individual during a specific membership (calendar) year. Membership dues may be paid by school districts, colleges, universities or other governmental units; or by individuals.

LIBRARY MEMBER. $10.00 per year. Non-voting. This is a "publications membership" for public and private libraries and college and university libraries and can be used for training future school business officials. Does not carry annual meeting privileges. Public elementary and secondary school libraries are not eligible.

STUDENT MEMBER. $3.00 per year. College and university students enrolled (presumably full-time) in school administration are eligible for this membership. Non-voting, but carries annual meeting privilege.

EMERITUS. $3.00 per year. Emeritus memberships shall consist of an active member: 1) having reached retirement age, or 2) having left school business in preference for another vocation after a minimum of fifteen years of active membership in ASBO. This membership to be non-voting and with fees sufficient only to cover such publications to which the member may be entitled: *School Business Affairs* and selected other publications.

LIFE MEMBER. $200 payment (at one time). School Members (Representatives) may become Life Members upon payment of two hundred dollars. All School Membership privileges are retained. This is an individual membership, and must be made to a person, not to a school.

FOR BOARDS OF EDUCATION AND OUR BUSINESS ASSOCIATES:
PUBLICATIONS SUBSCRIPTION. $20.00 per year. This takes the place of the former Associate Membership, which no longer exists. Subscriptions are taken by persons directly associated with or concerned in the aims and objectives of ASBO, including our exhibitors, advertisers, elected school board members, and other business associates interested in the field of school business management. A Publications Subscription may be addressed to a school board member, or to a business firm, but the $20.00 includes one (1) subscription to SCHOOL BUSINESS AFFAIRS, the ANNUAL VOLUME OF PROCEEDINGS, and one copy of each research bulletin published during a specific year.

—OFFICIAL ANNOUNCEMENT—

YOU are cordially invited to enjoy the benefits of being a Member – or a Subscriber – in the ASSOCIATION OF SCHOOL BUSINESS OFFICIALS of the United States and Canada during the current year.

ASBO – as the Association is familiarly known – is an international professional educational organization, incorporated for service and "not for profit" under the laws of the State of Illinois, U.S.A. ASBO has as its major goals the improvement of efficiency in the school business operation; the wise expenditure of taxpayers funds; and the advancement of the understanding and application of modern school business management principles, policies, practices, methods, procedures, and techniques. ASBO furnishes professional leadership to practitioners in the school business field, within the profession of Education.

WHAT DO YOU RECEIVE FOR YOUR $20.00 AS AN ASBO MEMBER OR SUBSCRIBER??

1) A subscription to the monthly newsletter-journal, SCHOOL BUSINESS AFFAIRS, that is a source of news and valuable information in the field. It publishes a placement service that operates through "Personnel Exchange." It is indexed annually, each December.

2) The privilege of attending the Annual Meeting and Educational Exhibit. Held each October, this professional event is the school business highlight of the year. The member has an opportunity to listen to inspirational speakers at the General Sessions; to learn more about specific areas of school business management in the 21 different discussion groups – called Section Meetings; and to learn solutions to his individual problems at the Clinic. The Annual Meeting is a truly memorable occasion and looked forward to by each member.

3) A copy of the ANNUAL VOLUME OF PROCEEDINGS, ADDRESSES, AND RESEARCH PAPERS – which is a hardbound book of about 500 pages, published each year following the Annual Meeting, fully describing the activities, speeches, reports, et cetera of each Annual Meeting.

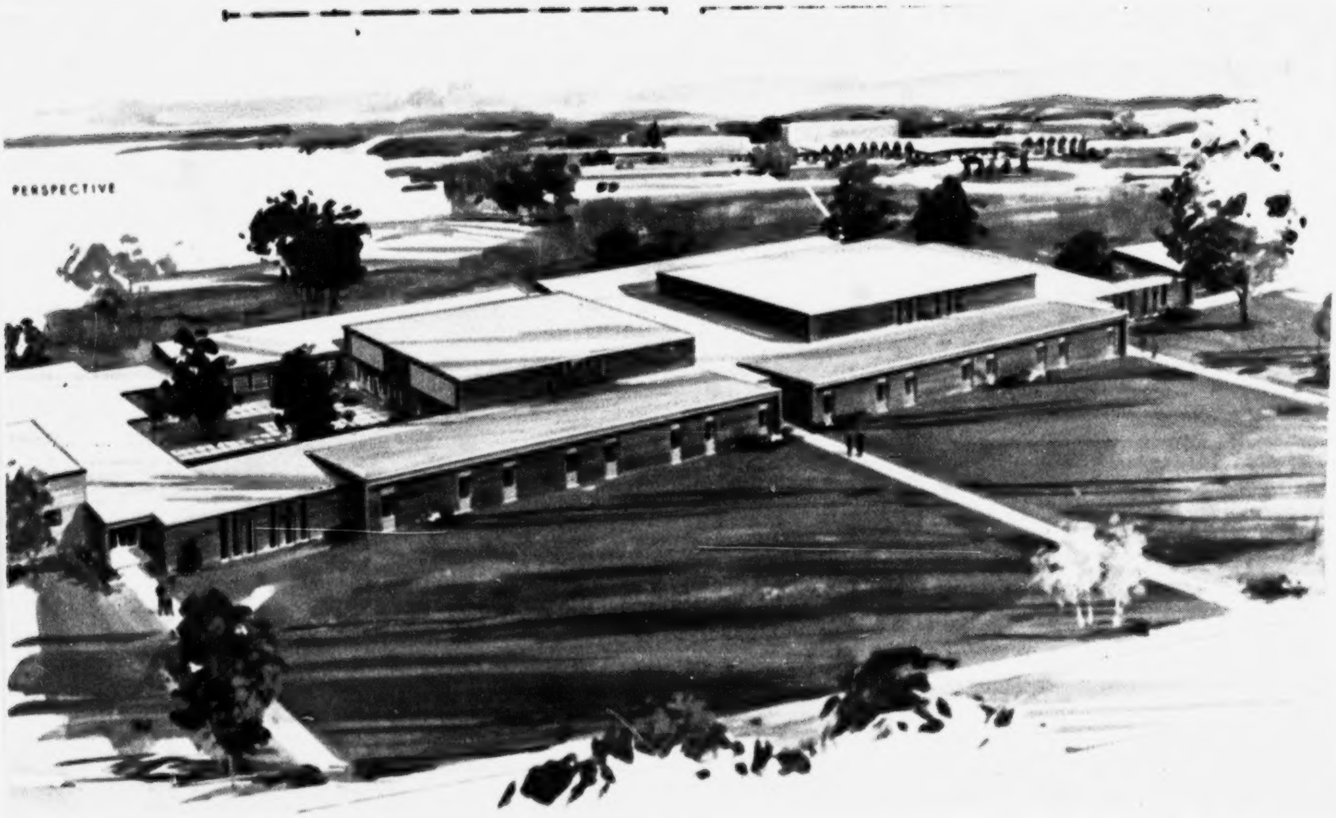
4) At least one RESEARCH BULLETIN per year, usually two or more. Each research bulletin represents a practical and useful research project in school business, and brings important and valuable information to the member that assists him in his work.

5) An Annual Directory – called THE BLUE BOOK OF SCHOOL BUSINESS ADMINISTRATION, containing the names, titles, and addresses of each ASBO member and subscriber as of December 31 each year. This is a very valuable reference that is used often by the typical member.

6) An Information Service for Members, conducted by a professionally trained Librarian through the ASBO Research Library. Write her about your research problem, or practical problem in school business, and give her an opportunity to assist you, through our Library. Its collection contains numerous Canadian publications and periodicals.

7) An opportunity to purchase previous publications in school business at cost prices. Please refer to the ASBO Purchase Order blank.

Architectural drawing courtesy of Richard Prince & Associates – Kalamazoo, Michigan



An Educational Research Organization
Incorporated Not for Profit
and a subsidiary of the

RESEARCH
CORPORATION

**Association of School Business Officials
of the United States and Canada**